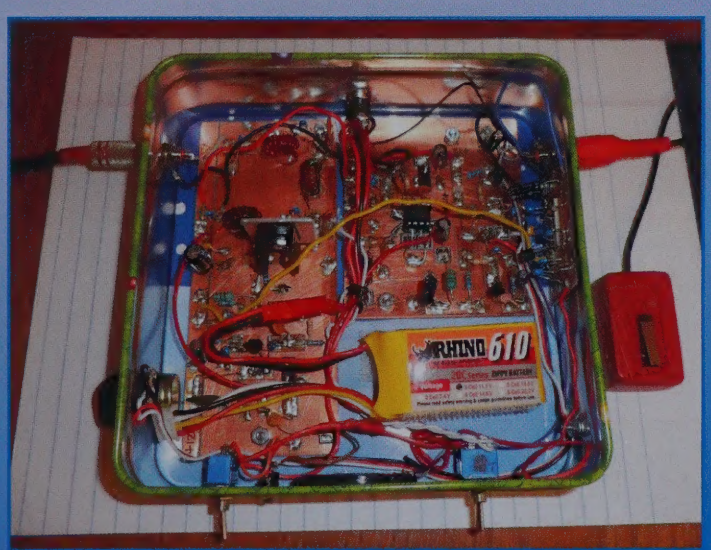
YOUR CONSTRUCTION AND OPERATING QRP SOURCEBOOK

QRP Quarterly

Volume 60 Number 3
July 2019

Journal of the QRP Amateur Radio Club International

It's July, but KA4KXX shows off his "Merry Christmas Rig"



- Bob, K5RWT says—Your Buddistick Needs More Support
- K4OCE Puts Some Air in His Aerial (Air Switches)
- Results of the FDIM 2N2222A Power Challenge
- Portable Antennas for QRP by N2CX (SK)

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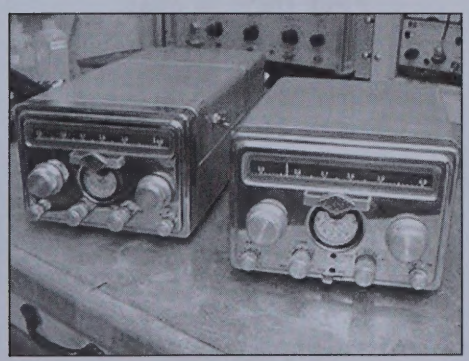

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And check out the *QRP Quarterly* advertisers on covers II, III & IV, and pages 2 & 5 Thank them for their support!

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Editorial

Mike Malone—KD5KFX editor@qrparci.org

Greetings and salutations to you all, and if you are reading this... congratulations. You have survived the "HamComs, Ozarkcons, FDIMs, Daytons, and Field Days" of your world for another year, hopefully not too much the worse for wear. I almost need another cup of coffee just typing that sentence. Driving home from the airport after a business trip, tuning thru the AM band I heard some guy speaking to a call in on a talk show... droning on about "time being a fantasy". As of late, it is a darned realistic fantasy for me and there never seems to be enough of it to go around. Apparently, my mere mention of my antennas surviving the storms in my last editorial was seen as a direct temptation to the tempestuousness of weather and time. Instead of the antennas' demise, a storm peeled my roof off ago about a month ago... so in the emergency patching, un-tarping for insurance claims adjusters, and getting quotes, my antennas are dismantled. I have always been one to at least try to make lemonade when I obtain lemons, but have yet to convince my wife that a couple of really tall towers or telephone poles would divert further roof issues. Quite honestly, climbing the two story house is probably all the adventure I really need anyway, so I have been working on a secondary setup. Since I probably will not be able to make it the gargantuan of my dreams, I shall shoot for a secondary goal... operating comfort. I am also using a pine tree in my front yard for the support as it seems to survive the last two 70+ mph straight line wind assaults we have had in North Central Texas this last June. This is just a simple antenna, for QRP HF. The real goal will be for operating in the den/living room from the comforts of sofa or lazy boy, but capable of being run from the computer desk as well. No more dungeon-like bedroom alcove for me. I am going to run a multi band end fed. Simple, direct, and to the point.

The pine tree end fed antenna idea originally sprouted as a multiband wire vertical just as an alternative antenna. It has been kicking around in my head ever since I noticed the live Christmas Tree we planted 22 years ago is now over 30 feet tall. Seeing that Home Depot rents those lifts on a trailer kind of led me to think, I am going to do that someday. Enter now what I have seen as a new fad, the "XXX, date, name" newsletters that many of the QRP supply companies email out. In this case it was from QRP Labs and they had a nifty little 9:1 balun kit. I ordered it, thinking a little end fed in the front yard could be really neat. I could run it from the shade by the grill, or into the living room and plug in one of many QRP rigs for some lazy, impromptu operating and still be near my XYL. Besides, I have a pneumatic spudzooka that will make erecting this thing a breeze. So the idea actually germinated before I had a true need for the finished product. Storm comes, I need an antenna, it is the solution I was literally already in motion on. The balun is remote mounted in a piece of Tupperware and all pass thru points are silicone protected to preserve balun freshness. Some scrap PVC tubing handled the buried coax just fine, and with a tuner I now have 40 thru 10 meters adequately covered.

Admittedly, I have mostly been listening, but I am on the air. I am actually thinking of moving my VHF/UHF antenna to the chimney and perhaps putting my 6 meter portable yagi and TV rotator up on that end of the house and using my '817 as a multiband, multi-mode monitoring station. I have been piecing this together in the various moments of spare time meets motivation moments. We are about to be into our hottest months, and I have a few kits to build, so it doesn't look like Texas heat madness shack nasties are going to be my demise this year.

I never come away from QRP gatherings without some ideas, or for that matter some lustful desires for a new radio or two. This year proved no exception when I saw what people are doing with the multiband BITX's and touch screens, new firmware, power supplies, etc... that will probably be my fall project this year. I have the first BITX 40 kit that was sold already soldered with all the parts to assemble. I am thinking about adding some bells and whistles to that rig too. I hope you all are finding some things to be interested in and that some idea sparks activity at your shack. Bob's pneumatic switch idea already has me thinking about adding an inverted L style end fed antenna for 80 meters... that's how this stuff works.

—72 es GL de Mike KD5KXF

From the President

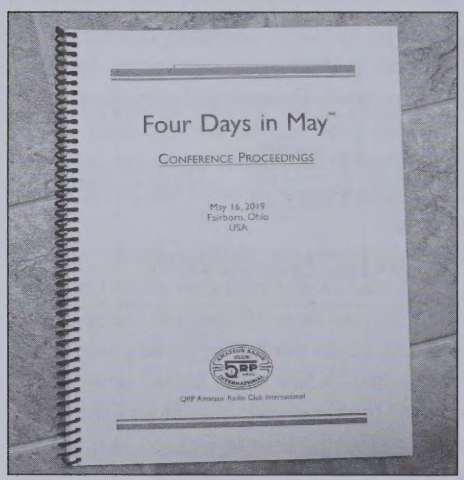
Preston Douglas—WJ2V president@qrparci.org

The deadline for this issue found the QRP QRCI President recovering from a medical procedure. His comments will return next issue! We all wish him a speedy recovery (which is already underway).

QRP ARCI News

FDIM Proceedings Available

A reminder from the QRP ARCI Toy Store Manager Bill Kelsey, N8ET (n8et@woh.rr.com) —



I have the remaining stock of the 2019 FDIM *Proceedings*. They are available from me at $15 plus shipping:

Domestic First Class	$3.00
Domestic Priority Mail	$7.00
DX - First Class	$17
DX - Priority Mail	$35

I also have the 2018 and 2017 FDIM Proceedings at $5.00 each plus shipping.

Some back issues of *QRP Quarterly* are available at $2.00 each plus shipping—$2.00 First Class or $7.00 Priority.

Postage rates have gone crazy the past couple of years! Contact me if you want some combination of the above items shipped to you.

Our Paypal payment account is gqrp@woh.rr.com — be sure you indicate what you want and where to ship it! And don't worry; the funds go to QRP ARCI. The "gqrp" Paypal account is just a convenient way for me to handle payments.

Correction from the Editor

I received a note reminding me that we made a mistake—please accept my apologies James. This is in regards to the HT-1A review James wrote in the last issue. His callsign is KH2SR, not the callsign published. *—Mike, KD5KXF*

New QRPARCI Mail List

A new Mail List has been started for QRPARCI on the groups.io platform. This mail list is open to members and non-members alike for the discussion of QRPARCI topics. Jim Stafford W4QO is the moderator of the list and you can gain access by sending an email to qrparci+subscribe@groups.io and requesting to be added to the mail list. You can get your mail in digest form as well if you prefer it that way.

—73 de W4QO

QRP Clubs and Groups

The club website has a list of local QRP clubs that our members might like to check out—

Alaska QRP Club
Arizona ScQRPions QRP Club
Austin QRP Club
Central Florida QRP Group
Explorers Radio Club
Flying Pigs QRP Club International
Four State QRP Group (4SQRP)
GQRP Club
Hawaii-QRP Club
Knightlites QRP Club
Michigan QRP Club
New England QRP Club
NOGA QRP Club
NORTEX QRP Club
North American QRP CW Club
Russian QRP Club
St. Louis QRP Society
The Colorado QRP Club

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Please contacting the most appropriate person with questions or comments—

- *QRP Quarterly* not arrived, general QRP ARCI queries — contact QRP ARCI President
- Problem with subscription payment, change of name/callsign/address — contact QRP ARCI Membership Secretary
- Website query — contact Webmaster
- Contest query — contact Contest Manager
- *QRP Quarterly* editorial and article submission — contact Editor of *QRP Quarterly*
- *QRP Quarterly* back issues — contact Toystore Manager
- *Best of Idea Exchange* book orders — contact Toystore Manager

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●●

Idea Exchange

Technical Tidbits for the QRPer

Mike Czuhajewsi—WA8MCQ wa8mcq@verizon.net

In this edition of the Idea Exchange:

N2CX Silent Key
Portable Antenna Minutia—N2CX
Popup Antennas for a Popup Camper—K4LXY
Snack Tubs Hold Hardware—ND6T
Line Frequency as a Counter Time Base—KCØZNG
QRP Dummy Load with RF Indicator—K4LXY
More Fun with Magnets—ND6T
Two QRP Digital Power Meters—K4LXY

N2CX, Silent Key

I am deeply saddened to report that Joe Everhart, N2CX, passed away on 14 May 2019 at age 73. He is survived by two sons and two grandchildren. Although he had cancer a few years ago, successful treatment resulted in a complete recovery and there is nothing to indicate that it was involved in his passing.

From the obituary on the funeral home web site: "In lieu of flowers, contributions may be made to the American Cancer Society, 1851 Old Cuthbert Road, Cherry Hill, NJ 08034. Please write Joseph Everhart in memo."

If you wish to leave some brief comments about him you can go to his obituary on the funeral home web site at

http://www.mccannhealey.com/obituary/joseph-everhart

Scroll down to GUESTBOOK at the bottom and click on VIEW & SIGN.

In addition to writing for the *QRP Quarterly*, Joe was well known as a technical speaker at various QRP events around the country. Some people have engineering degrees and some people are engineers. Joe was both. He will be greatly missed by many.

Portable Antenna Minutia

WA8MCQ intro—Joe sent his first input to my column for the January 1991 issue. Describing a simple audio oscillator, he started out with "I love quickies. That is, I like simple little circuits built for special purposes…" He used the term a few times over the years, and so did I; I numbered them sequentially. In the first 3 years he submitted 7 and after that had one in every issue except one. Sadly, this will be the final one.

I always smiled a bit when I'd start working on the next issue and send him mail with the subject line "I need a Quickie". I was always careful to capitalize it so if it ended up in the wrong in-box, hopefully no one would get the wrong idea! *—MCQ*

From Joe Everhart, N2CX, #109 and the final installment in the endless string of Technical Quickies he promised me years ago—

Since the National Parks on the Air (NPOTA) activity rekindled my desire to operate portable in 2016 I have been doing quite a bit of experimentation with antennas suitable for those activities. Many of the efforts have been documented in previous Joe's Quickies. In this piece I want to nail down some of the things I've learned in my trials. In past writings I've glossed over some details that may be of interest to others who want to duplicate my efforts or to make some similar antenna setups.

Most of my activities involve short operating sessions, perhaps an hour or so at a time since things tend to peter out after that period. Additionally, many parks either discourage or outright prohibit use of their trees as antenna supports, do not allow separate poles or towers, and many won't even let you drive stakes in the ground.

My experience is with both federal and state parks in the eastern US, though I know that in general campgrounds and many wide-open parks are less restrictive. For the above reasons I generally rely on using my vehicle as an antenna mount and usually use either antennas that are completely on the car or will at worst fit into a single parking space. In poor weather operation is from inside the car, though when possible it's more pleasant to run a feedline away from it and sit at a park bench, a picnic table or even a folding chair and enjoy the surroundings.

Figure 1—Pole mounted on the car.

GO-TO Antenna

The most frequently used skywire is what I've come to call my GO-TO antenna, described in various forms in several Quickies (see References below). It is a 16-1/2 foot length of wire run up a telescoping fiberglass pole. The pole is attached to a common mobile antenna mount with a special adaptor. The mount is also grounded to the car to assure a solid, effective ground connection. By itself the wire is resonant on 20 meters and I use loading coils to tune it to resonance on 30 and 40 meters. This configuration meets the criterion of being entirely on the car

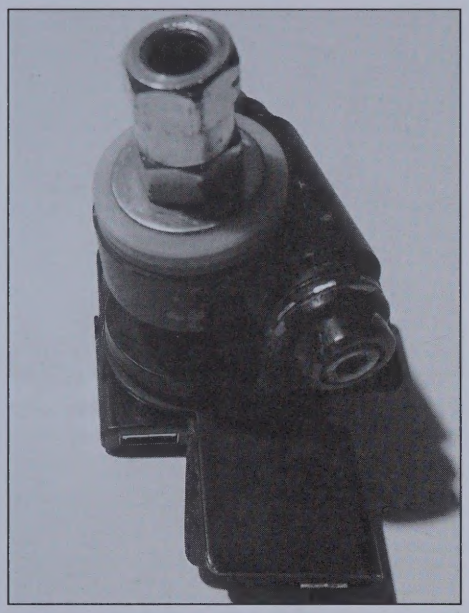


Figure 2—Bare Diamond mount.

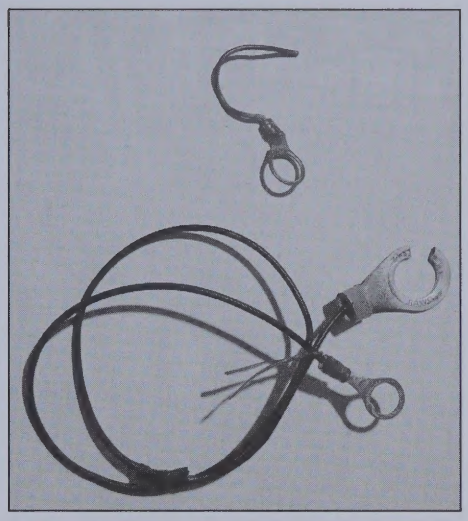


Figure 3—Lugs and wires for hot side and ground of mount.

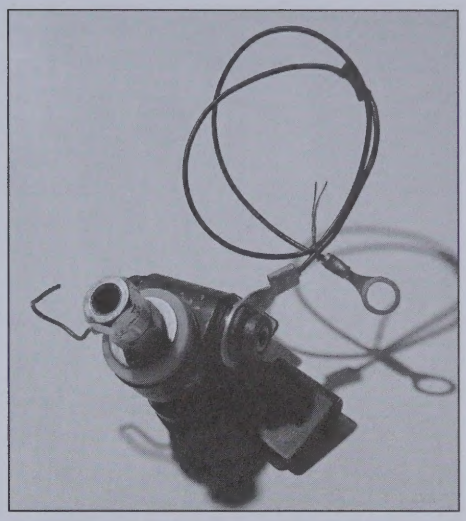


Figure 4—Wires/lugs installed on the Diamond mount.

and, other than the usual "what the heck" stares by passersby, is acceptable in most of the places I've used it. However it is NOT rugged enough to be permanently attached. It is stored in the car and setup and teardown take less than 10 minutes each even in inclement weather.

The mobile mount I use is a Diamond K400-3/8C. It's a tad pricey at about $85 but is the most rugged one I've found. Similar offerings by Comet and MFJ are not strong enough to hold more than VHF antennas. It attaches to the rear hatchback of my SUV as shown in Figure 1. The mount as purchased is shown in Figure 2. You may note that this one is a little careworn from years of use. It is my spare and one that I carry along when away from home to mount on rental cars. Since many cars these days have too much plastic and too many curves to let you mount it on a hatchback and since sedans don't have hatchbacks, it can also be mounted on the top lip of an auto trunk or even the side of a hood.

I've made two additions to the basic mount for use with the GO-TO, a loop of wire on the "hot" antenna connection hardware and a ground wire to attach to the vehicle. They attach with solder lugs and are illustrated in Figure 3 by themselves and as installed in Figure 4. The hot lead is where the antenna connects to the mount's coaxial feedline. The ground wire is extremely important for antenna efficiency and effectiveness. On the hatchback or trunk lid the far end is connected to hinge hardware by means of another solder lug. I have found that 18 gauge stranded wire is sufficient electrically and rugged enough for continued service. Yes, I know that a more solid connection to the car structure would be theoretically better, but, without nasty vehicle modifications and lots of bother, this scheme just plain works!

An adapter is needed to affix the GO-TO onto the mount. I use a 4-inch long 3/8-24 bolt run through a wooden dowel and held in place with a lock washer and nut. Hint—when you drill a hole through the dowel it's best to use a drill press and machinist's vise to keep the hole centered. The pieces and assembled adapter can be seen in Figures 5 and 6. Though 3/8-24 hardware is not too common, I've been able to get it at my local True Value hardware store and sometimes at Home Depot. Figure 7 shows the adapter on the mount on the car.

The dowel diameter is sized to fit into the telescoping fiberglass pole used for the antenna. I use either a 16-1/2 foot Black Widow™ pole or, more recently, a "7.2m" pole from an offshore vendor found on eBay. The size is in quotes since it actually measures about 17 feet; 7.2m is a little over 23 feet. Note that in Figure 6 I had duct tape on the adapter for a good fit into the pole. Figure 8 is the pole slid onto the mount and adapter.

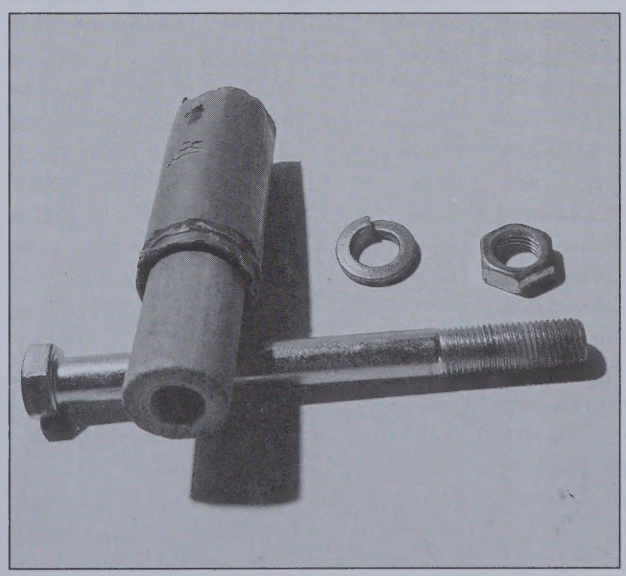


Figure 5—These are the pieces that make up the mount adapter

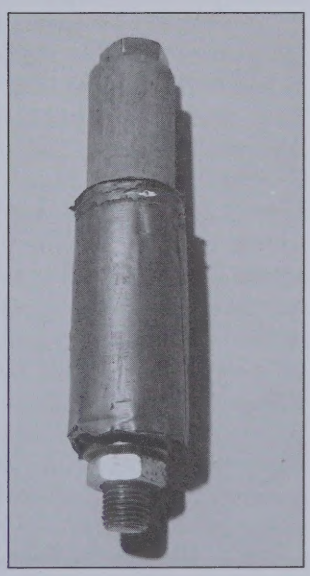


Figure 6—The assembled adapter.

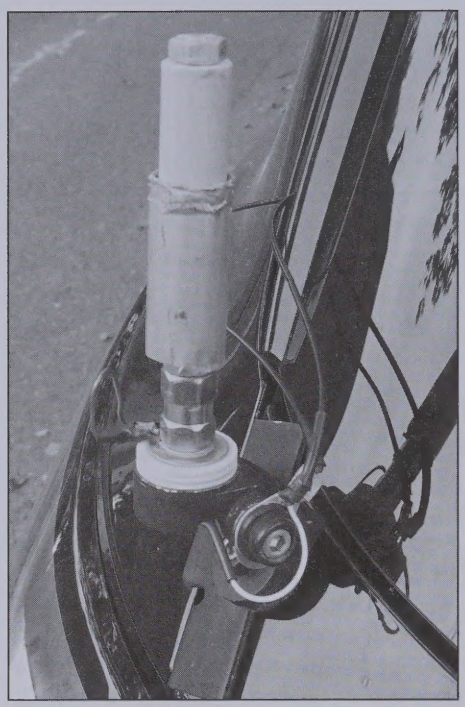


Figure 7—Adapter installed on the mobile mount.

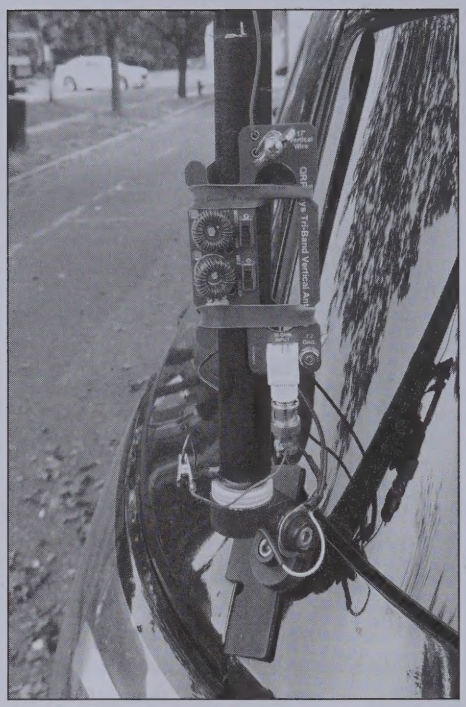


Figure 8—Pole on the adapter and mobile mount.

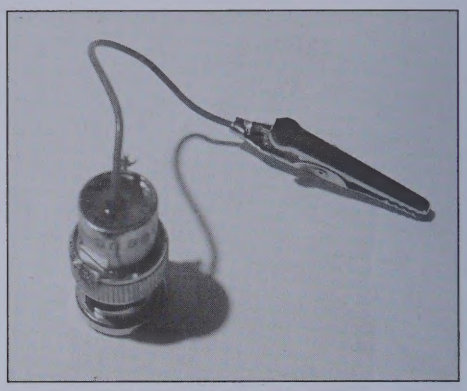


Figure 9—Male BNC to alligator clip adapter.

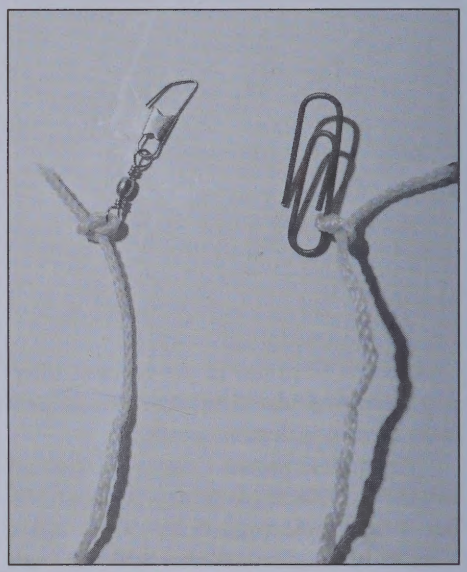


Figure 10—Interlock snap and paperclip wire connections.

In Figure 8 you can also see the QRP Guys (https://qrpguys.com/) tri-band vertical loading coil board which allows the antenna to work on 30 and 40 meters. As noted in earlier Quickies, I originally used an air wound inductor for the loading coil, then a piece of Vector board with a couple of toroids in its place. Careful measurements of the antenna with an antenna analyzer showed that the higher Q of the air wound coil made only a marginal difference in antenna efficiency.

QRP Guys noted my toroid version and designed a much more professional printed circuit board version using switches for band changing rather than my clumsier alligator clips. Go to "Portable 40-30-20m Tri-Band Vertical Antenna" on their web page. The board is conveniently contoured so that you can wind your antenna wire around it for storage. It is held in place on the fiberglass pole by a couple of heavy rubber bands as seen in one of the photos. (It automatically scrolls through several photos. Wait a bit and the one with the rubber bands will eventually appear.) The best ones I've found are the ones used by supermarkets to secure bunches of asparagus or other vegetables.

There is yet another homebrew gadget that connects the board to the mobile hot lead of the antenna mount. It's simply a BNC male connector with a short lead soldered to the center pin with the far end of the wire soldered to an alligator clip for attachment to the mount's hot lead. To hold the wire and pin in place, the open end of the BNC connector is filled with 5 minute epoxy. Figure 9 shows the finished connector and wire.

The antenna wire itself connects to the top of the loading coil board via a bolt and wing nut and runs vertically up the pole. Cut it to be resonant at the part of the 20 meter band where you operate with both of the loading coils switched out. Attachment to the top of the pole is accomplished in various ways. Many of the telescoping fiberglass poles, including the Black Widow, have a loop at the top where a wire or attachment line can be tied off. I find it quicker to use some sort of fastener to do the job.

The left side of Figure 10 shows one option, using a fishing line interlock snap available from almost any sporting goods shop or Walmart. It makes a secure connection; however, my septuagenarian fingers fumble with it when they're cold. The second method is to simply tie the wire onto a metal paper clip, which is then hooked onto the pole's top section loop (right side of Figure 10). As it turns out, with the 16-1/2 foot pole the wire is a tad longer than the pole, so the wire is tied off with a couple inches sticking out horizontally. This has no ill effects. At one time I also used a 20 foot telescoping pole so I had to use a non-conducting attachment line, which was tied directly to a knot on the end of the wire and to one of the fasteners at the other end as described above.

Things are a bit different with the eBay pole. It is much more flexible (meaning flimsy) than the other poles and doesn't have a connection loop at the top, but a short length of string. This is quite awkward to directly connect to, and tying to it could potentially break the top section. Fortunately, the pole is long enough that the antenna wire need only extend up to the point where the top and second sections come together. The first method of attachment I used was to simply knot the end of the wire just above the second sec-

Figure 11—Knot to attach wire to pole.

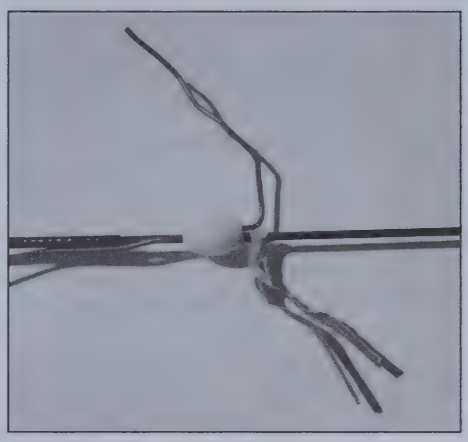


Figure 12—Jewelry bead and twist tie wire attachment scheme.

tion as shown in Figure 11. This works OK, but one must exercise caution to prevent damage to the pole and with fumbly fingers it can be clumsy.

The definitely non-elegant solution I came up with was to slip an appropriately sized plastic jewelry bead over the top section of the pole and run the wire through it where the two pole sections come together. The wire is then bent over and the bead holds it in place. I bought a bag of various sizes of beads at a local craft store and simply selected one that fit snugly over the wire. The wire was cut long and the end splayed out horizontally to hold the bead in place (Figure 12), then trimmed for resonance on 20 meters. Serendipitously, it meant that only 2 or three inches remained when trimmed. A later refinement shown in the photo was to add a twist tie to secure the bead as the pole flopped around in windy weather.

One final tip. You want the antenna wire to run straight up the fiberglass pole without spiraling around it. I like it somewhat loose so that it won't pop off when the pole bends in the wind, but do secure it to the pole with hook and loop fasteners at about the 1/3 and 2/3 points along its length.

Not mentioned in earlier Quickies is that the resultant SWR of the GO-TO is not 1:1 like the more common Hamstick type antennas. This is because the ground and loss resistances keep the feedpoint impedance below 50 ohms, unlike the Hamsticks. At resonance SWR is below 2:1 on 20 meters and slightly higher on 30 and 40. This means only a small additional loss in the feedline and the antenna tuner in my Elecraft KX3 transceiver matches it quite easily.

References:

1. Joe's Quickie No. 96, Kluge Fixed Mobile Antenna, Idea Exchange, April 2016
2. Joe's Quickie No. 101, "Plan B" Antenna Loading Coil Scheme, Idea Exchange, July 2017
3. Joe's Quickie No. 102, "Plan B" POTA Antenna Wrap-up, Idea Exchange, Oct, 2017

—DE N2CX

Popup Antennas for a Popup Camper

From Howard Zehr, K4LXY—

I'm always on the lookout for QRP antenna configurations to use with my little Aliner hardshell popup camper. They must be easy to set up, fit within the confined real estate of a typical campsite and, of course, work.

For some time I used the End-fed HF Matchbox Antenna from Hawaii Emergency Amateur Radio Club (Ref. 1) in its normal horizontal configuration. See Figure 13. This consists of a small matching transformer that you can buy from them although I built mine using their excellent instructions. The feedline, which needs to be at least 16' long, serves as a counterpoise. I supported the matchbox with a 23' flag pole and terminated the approximately 30' radiator with a 16' crappie pole. Although this may not be the most efficient antenna, I have made many contacts with it on 40M and 20M. It requires use of a tuner.

More recently I wanted an antenna that was even easier and quicker to set up for those occasions when I didn't want to use a second pole, so tried this antenna in a vertical configuration (Figure 14). A 31' telescoping Jackite pole (Ref. 2) is perfect for this. To anchor the pole, I have a piece of 3" PVC electrical conduit attached vertically to the bumper, into which I drop it (Figures 15 and 16). I attach the end of the antenna wire to the tip of the pole and erect it, resulting in the matchbox hanging about a foot from the ground (Figure 17). The coax feed lies on the ground.

I have only begun to use it in this con-

Figure 13—Complete EARC antenna in its storage box.

Figure 14—EARC antenna in vertical mode.

Figure 15—The pole drops into a piece of PVC pipe attached to the bumper near the spare tire.

Figure 16—Close-up view of the PVC pipe on the bumper.

figuration but have made solid contacts with it.

My favorite portable antenna, though, is the LNR 10/20/40 Trail-Friendly end fed antenna. (Ref. 3.) For carrying, it rolls up onto itself into a tiny package (Figure 18). Once cut to length, it requires no tuner on 40M and 20M and can even be fed directly from the rig, without coax.

I mounted a BNC bulkhead connector through the wall of the camper near the outside shower. (This particular camper version has a water heater inside and a shower on the outside.) Seen in Figure 19 are the shower head with hose and handles for the hot and cold valves. This is a place where the wall is thin enough to use a simple bulkhead connector.

To erect the antenna, I attach the matchbox to the connector with a short coax jumper. The wire radiator is held away from the camper body with a wooden arm. I discovered that the arm affected SWR when it got wet so I added a piece of plastic where the wire is held, seen in Figure 20.

The wire goes vertically to the top of the 23' flagpole, then runs horizontally to the 16' crappie pole, an L configuration (Figure 21).

The crappie pole is supported simply by sticking it onto a converted tent stake (Figure 22).

These arrangements have worked well for me, but I'm always looking for more. Maybe next I'll try a version of the 40M sloper described by Joe Everhart, N2CX, in his article "Portable Antennas in a QRP World" published in the 2019 FDIM "Conference Proceedings" (p. 73). The 31' Jackite pole should work well for this. Hopefully the camper frame will provide an adequate ground system.

References:

1. http://www.earchi.org/proj_homebrew.html
2. https://www.jackite.com/ online-store/cart
3. https://www.lnrprecision.com/store/EFT-10-20-40-Trail-Friendly-p39885475

—DE K4LXY

Figure 17—The matchbox hangs just above the ground.

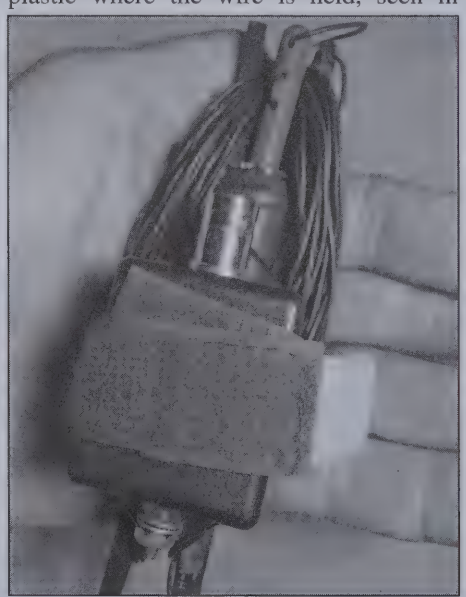


Figure 18—The LNR trail-friendly end fed antenna.

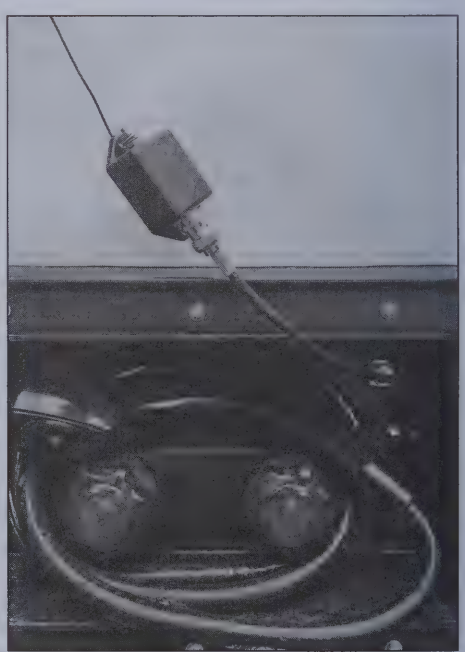


Figure 19—Matchbox attached to connector near the outside shower.

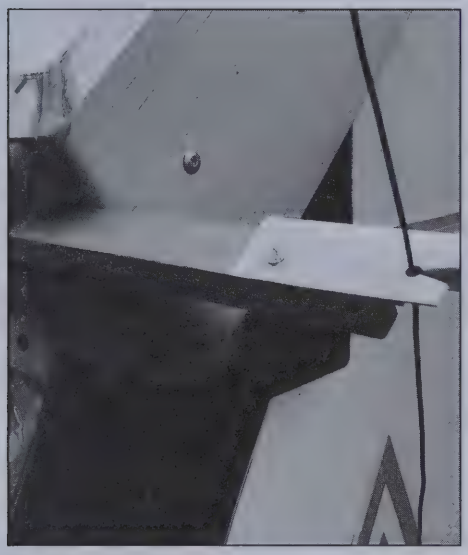


Figure 20—Wooden support arm with plastic tip.

Figure 21—Trail-Friendly antenna in L configuration.

Figure 22—Modified tent stake for crappie pole support.

Snack Tubs Hold Hardware

From Don Cantrell, ND6T—

When disassembling equipment for modification or repair it pays to keep track of all of the hardware belonging to the various stages. Doing so prevents extra parts appearing upon completion. It also reduces the fumbling and fit-and-try of finding which screw goes where.

Those little containers of applesauce and other fruit snacks are sold in small flat bottomed tubs, just the right size for holding small parts and hardware. Rather than put them in the recycle bin I like to keep a stack of them on the back corner of the workbench. As I remove the screws from a project, they get placed in one of these containers (Figure 23). If this is a complex unit with a sub-chassis, those parts go into another tub which gets stacked within the first one. The tubs are tapered nicely and form a stable nesting stack.

They are small enough to keep in (or along with) the project until it's time to put it all back together. I've been using these for close to two decades now. Half a century ago I used small cardboard boxes but non-uniformity, size, and construction were a real disadvantage.

If you are salvaging "eWaste" just use the same system. I separate self-tapping screws, nuts, washers, brackets and such into separate tubs. When the tubs are full they get further sorted into the proper parts drawers. It's a great pastime for when you are at loose ends.

—DE ND6T

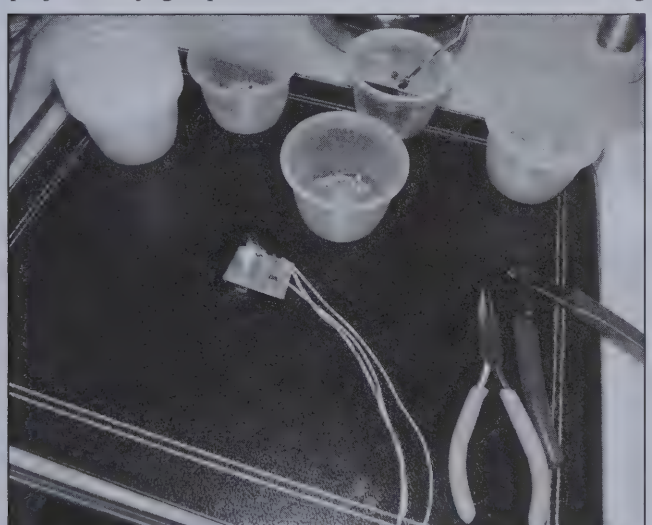


Figure 23—Plastic applesauce tubs are useful for holding hardware while working on things.

Line Frequency as a Counter Time Base

From Bryant Julstrom, KCØZNG—

In the 1970s and '80s, frequency counters and digital dials were made with discrete TTL and CMOS integrated circuits: counters, latches, drivers, and basic logic. The time bases in these units used crystal oscillators, whose output frequencies were divided down to the signals that controlled the counters and latches. Another frequency source that is almost always available is the 60 Hz line frequency. This frequency is used to regulate innumerable clocks; might it be possible to use it in a time base for a counter?

Described here is the development, in two steps, of a circuit that derives a counter's control signals from the 60 Hz line frequency. The answer to the question above is, "Well, probably not."

A test time base

We begin with a traditional RF frequency counter with six CD4029 decade counters. Its time base uses a crystal oscillator at 8 MHz. This time base controls the interval during which the counters count and generates latch signals (active high) and reset signals (active low). The unit counts in intervals of 0.1 second and divides the signal input frequency by 10. It displays the signal frequency, to the nearest 100 Hz, in the form xx.xxx.x MHz. It accurately reads input frequencies up to

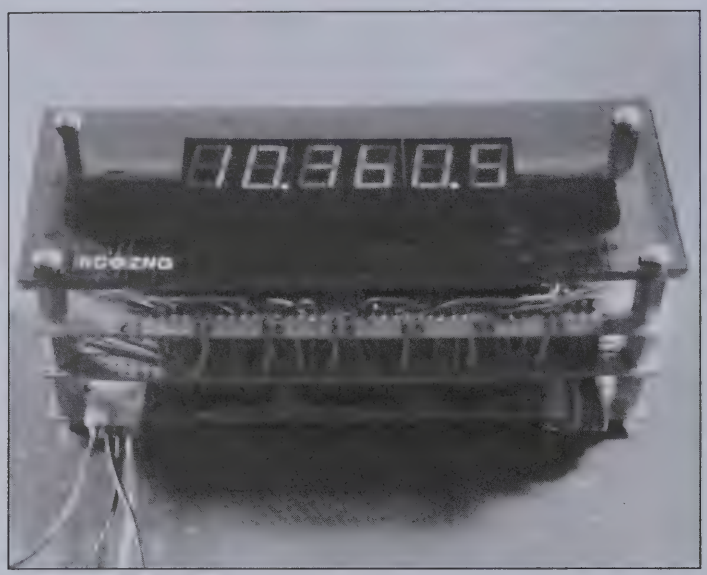


Figure 24—A traditional frequency counter with a crystal time base.

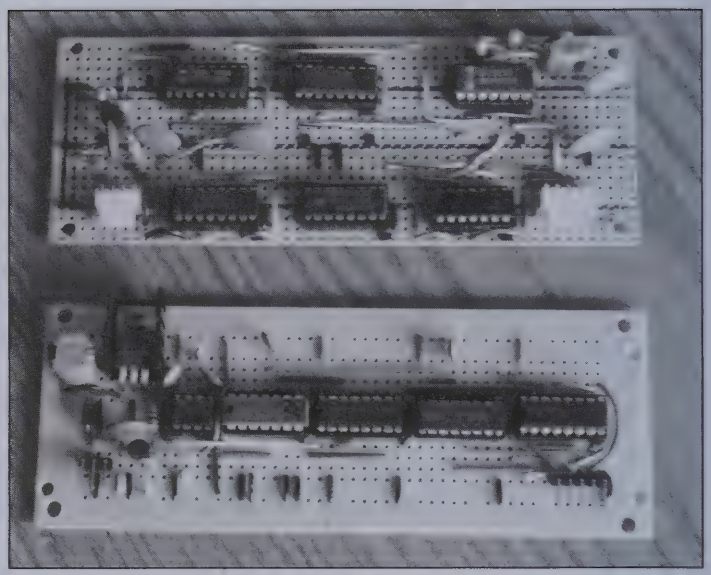


Figure 26—Top: The counter time base using an 8 MHz crystal. Bottom: The time base with signals derived from the 60 Hz line frequency, with a power supply.

about 33 MHz. Figure 24 shows this counter.

I replaced this time base—the bottom board in Figure 24—with one that derives control signals from the 60 Hz line frequency. Its initial form imitated the original time base in setting the counting interval to 0.1 second and dividing the signal frequency by 10.

A 60 Hz square wave was developed from the counter's power transformer through an NE555-based Schmitt trigger. This signal went to a CD4022 counter with eight decoded outputs. These outputs are normally low and go high in turn at each cycle of the input signal. Six of the '4022s outputs in a row are high for a total of 0.1 second. The other two outputs generated latch and reset signals, using a CD4572. (This handy IC contains a NOR gate, a NAND gate, and four inverters; I described the control circuit in the *QRP Quarterly* in the Summer/July 2014 issue.)

The signal being measured passed through an input circuit found in *Experimental Methods in RF Design* and was then divided by 10 in a 74LS196. A power supply (excluding the transformer) used a 7940T-5.0 three-terminal 5V regulator because I had some; a 7805 would serve as well. This time base was implemented on a Radio Shack protoboard.

Comparison

With the original crystal time base, the counter is stable on a signal near 10 MHz from my well-warmed-up Lafayette signal generator. The display jiggles only by one in its last digit. With the 60 Hz-based time base, the same counter was not stable. The last digit was essentially random, and the fifth digit also changed unpredictably.

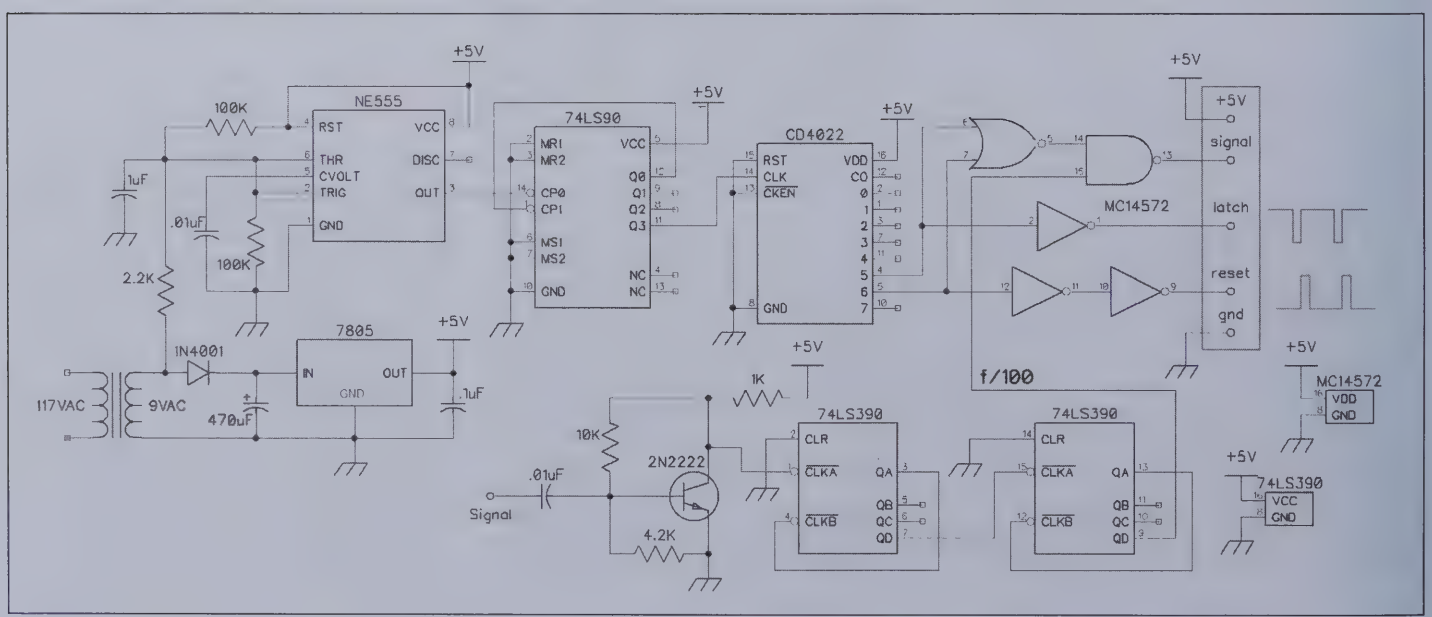


Figure 25—The power supply and 60 Hz based time base for a frequency counter.

Revision

In 0.1 second, a 60 Hz signal executes only six cycles. It seemed possible that this small number of time-base cycles was responsible for the counter's instability; tiny differences would be unlikely to average out. A second version of the circuit, then, divided the 60 Hz signal by ten to extend the counting interval to a full second—and 60 cycles—and divided the input frequency by 100, using a 74LS390 dual decade counter. Figure 25 shows the complete revised circuit, and Figure 26 shows the crystal- and line-based circuit boards.

Unfortunately, the extended counting interval did not eliminate the instability in the last two digits of the count. That instability is less annoying because it occurs less frequently, but it otherwise persists.

The line-frequency-based time base has the small advantage of requiring fewer parts, in general, so there's room for a power supply or other circuitry, but it cannot be adjusted and, most severely, it simply is not regular enough to be precise. It might be appropriate for counting at audio frequencies, but not at RF. I invite others to find a way to make this idea work, if possible.

—DE KCØZNG

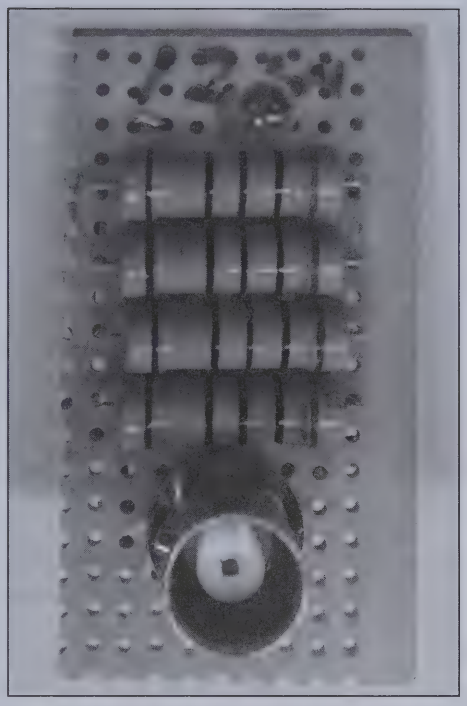


Figure 27—Dummy Load with LED.

Figure 28—Rear view of the load.

QRP Dummy Load with RF Indicator

From Howard Zehr, K4LXY—

Some time ago I built a 12 watt dummy load that was small enough to stick in a travel bag. I started with a 1"x2" piece of perf board, mounted a chassis-mount female BNC connector on one end, and wired four 200 ohm 3 watt resistors in parallel with it. I usually connect it directly to my rig or tuner with a male-to-male BNC adapter.

Recently I decided that it would be nice to have a visual indicator of RF output, so I added an RF pickup and LED. I used KC8AON's simple circuit (see ref.) although I left out the 5K pot and haven't blown out the LED yet. This consists of a FT37-43 toroid with 7 or 8 turns of #22 enameled wire connected to an LED. The lead from the resistors to the center pin of the BNC connector passes through the toroid. The LED is mounted on the perf board. See figures 27 and 28. Figure 29 shows it connected with a male-to-male BNC adapter and Figure 30 is the circuit.

When I don't have a dummy load on a portable outing, it seems that something inevitably comes up to make me wish I did. This way I not only have one but can see whether or not the rig is putting out power.

Reference

http://www.angelfire.com/electronic2/qrp/pwrout.html

—DE K4LXY

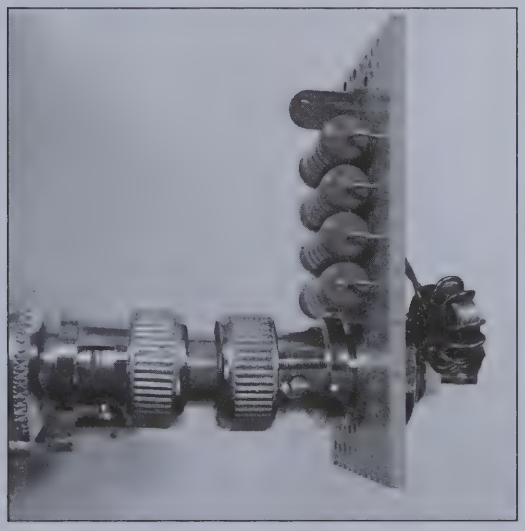


Figure 29—Male-to-male BNC connection.

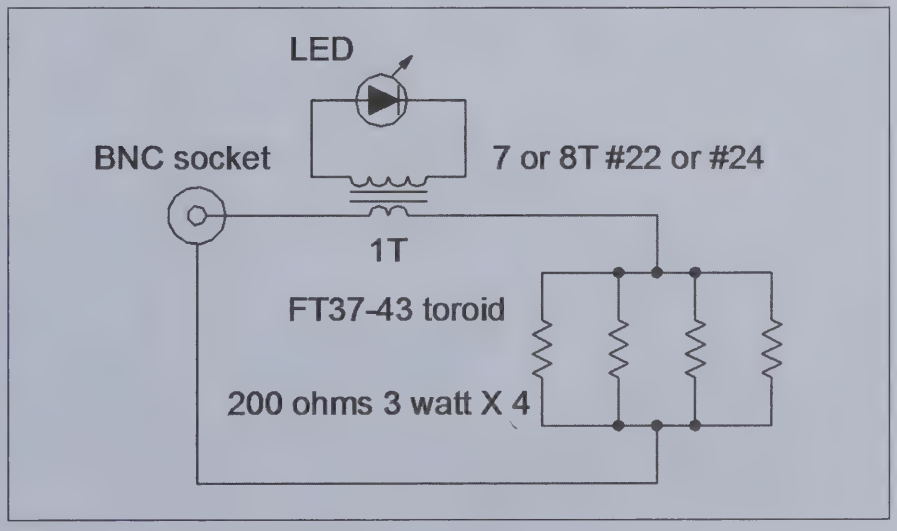


Figure 30—Circuit of the load.

More Fun With Magnets

Attractive Aids For The Bench

From Don Cantrell, ND6T—

Many of us use a metal baking pan (cookie sheet) on the bench when working with surface mounted components. The lip helps contain parts that try to escape to the shop floor. Instead of the usual aluminum tray, I make sure that mine are steel (and not stainless). Why? Because I can use magnets!

Four self-adhesive soft plastic feet beneath the pan keep it from sliding on the bench and a SolderScope (see Ref.) provides the weight to make it stable (and provide visual acuity, of course). My circuit board is then held in place with a modified watchmaker's bench vise. See Figure 31. Amazon and eBay have many available that cost under $10 delivered.

https://www.amazon.com/gp/product/B0719PZCDM

https://www.ebay.com/itm/332141882488

[*These links were still valid when I prepared my column in mid June. — WA8MCQ*]

These are miniature versions of the drill press vise but are made of cast aluminum alloy and easy to file. I used a triangular needle file to make grooves in the jaw faces to support my smallest boards. Larger boards can be held with the topside screws, either bare or with the supplied plastic pins.

Small button rare-earth magnets are positioned in the vise slots (normally used by bolts to hold it to a bench or drill press) and held there by epoxy putty or hot-melt glue. The magnets should be flush with the bottom surface. They give a firm grip to the steel pan. You can move the vise, but it will not slide accidentally.

This puts the work down low in the bottom of the pan. It is stable, at a level easy to work with, and the right focal position for the SolderScope.

Work Light

A good, bright light is necessary for doing fine work, especially if you are using a microscope or magnifier. I use a small "goose neck" desk lamp with an LED flood light in place of the usual bulb. That makes a very nice low level light with less shadows. It also makes the fixture a bit top heavy. To fix that problem I glued a couple of powerful magnets from old hard drives beneath the lamp base. I then set that lamp in a second baking pan beside my work area. It also holds several other specialized vises and tools. The lamp is now solid and stable. You can move it but you need to hold the pan with your other hand when you do.

More magnets

Those little button magnets that you find in craft stores to be used by woodworkers as lid closures are endlessly useful. I have several atop my desk lamp base randomly scattered to hold test clips and adapters for my DMM, straight pins (for insulation piercing during testing, clearing glue nozzles, etc.), and perhaps a hex wrench that I am using. Many of my wall-mounted parts cabinets have metal walls and several of the little button magnets are stuck there. I use them for keeping the various sizes of hex wrenches used in knob set-screws available. These cabinets also hold a magnetic light (or two) as well as clipboard clips on magnets.

Reference

K9AC, April 2018 *QRP Quarterly,* p. 20, or www.qsl.net/k9ac/solderScope

—DE ND6T

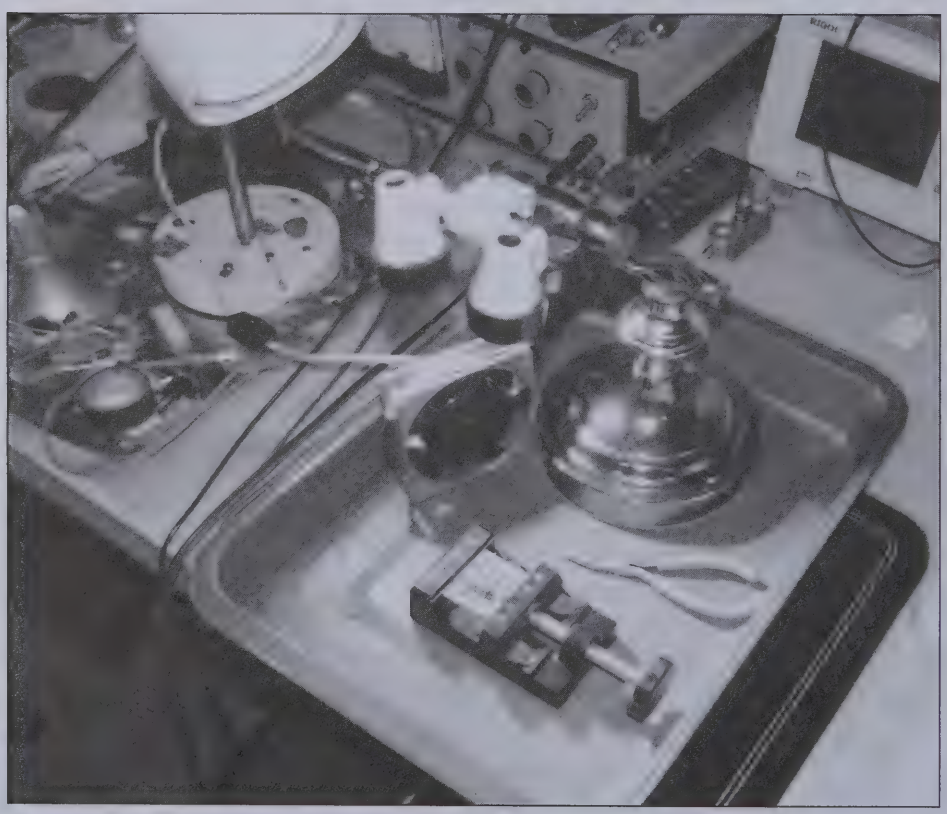


Figure 31—Steel baking pan on the bench for working with surface mount parts.

Two QRP digital power meters

From Howard Zehr, K4LXY—

I've been on the lookout for portable QRP RF meters that read power and, ideally, SWR. I have one of the classic Oak Hills WM series meters but it's too bulky for portable use. Here are two options that fit my needs.

Figure 32—NMØS QRPoMeter.

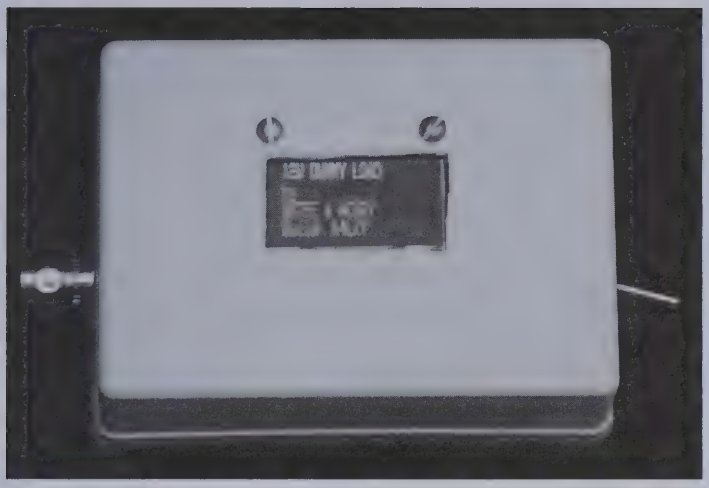


Figure 33—Homebrew power meter startup screen.

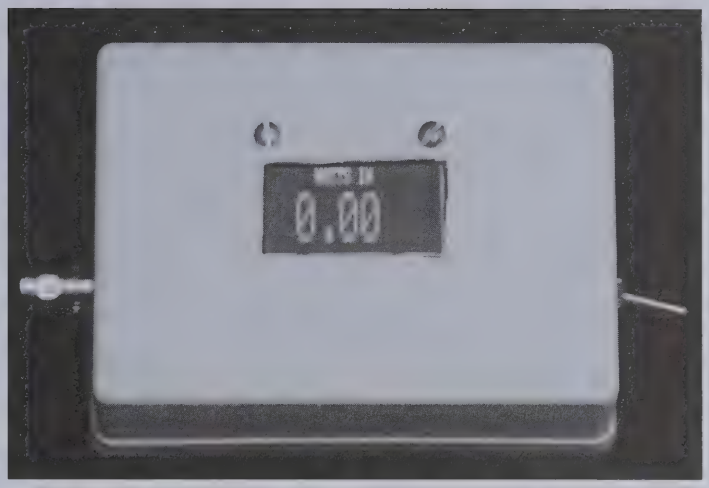


Figure 34—Ready to read power.

The most versatile and elegant is the QRPoMeter kit designed by David Cripe, NMØS (Figure 32). At one time it was sold by the Four State QRP Group but has been retired and is now sold by David from his site. The kit itself is very straightforward to build (no toroids, as the site notes) and well-designed overall. Although the kit has some SMD resistors, they are large and easy to install. The unit is too big (5-1/4 x 3-1/2 x 1-1/4") for a pocket (well, maybe not if you wear coveralls) but it is much more compact than the Oak Hills unit, is easier to calibrate and, using the calibration procedure described in the respective manuals, more accurate.

The QRPoMeter includes a dummy load as well as digital power and SWR readouts. Both readings are done with the dummy load in place, providing VSWR protection during SWR readings. This meter looks and works great and is a bargain at $50 plus shipping.

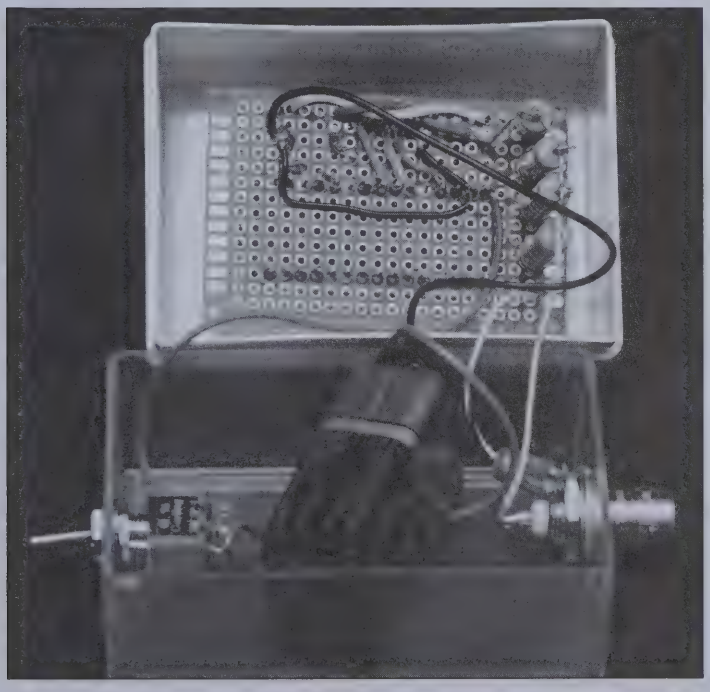


Figure 35—Rear view of development board; dummy resistors on the right.

If you want something smaller, maybe cheaper, that you can build from scratch, you might consider adapting the Arduino Nano-based dummy load/power meter described by Jack Purdum, W8TEE, and Al Peter, AC8GY, in the November 2018 issue of *QST* (p. 34). The article describes a 150W dummy load and digital power meter, but I substituted four 3W 200 ohm resistors in parallel for the oil-dipped array of resistors in the article. This arrangement should be good for up to 12 watts. I built the whole thing in one of the plastic boxes that photographic slides used to come in from the processor. See Figures 33 and 34.

The display is mounted to the box, and the circuit (including resistors) is constructed on a small development board and plugs into the display (Figures 35 and 36). An inconvenience in the way it is mounted in the box is that I have to remove the board, unplugging it from the display, in order to upload the program. If I were starting over, I'd use a box that allowed easier access to the micro-USB connection on the Nano (figure 37).

Jack and Al provide an overall description of the build in their *QST* article, but the link they provide in the article to extra material on the ARRL site is also essential. In addition to the code to be uploaded to the Arduino Nano, on this site there are additional instructions and details for building the unit. Much of the latter is

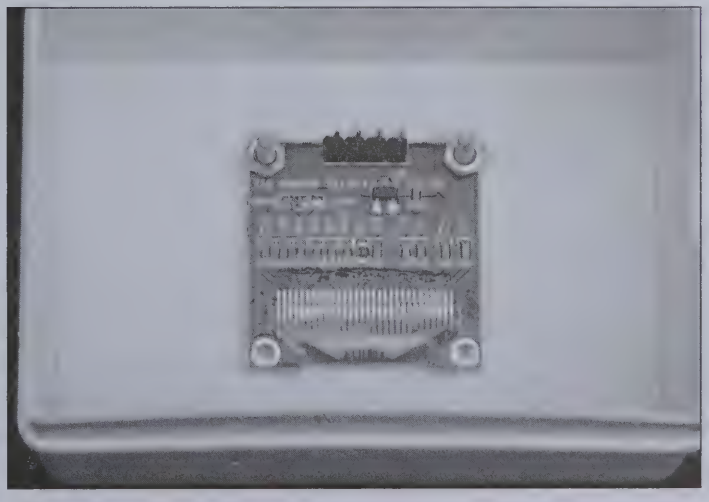


Figure 36—Display board mounted in box.

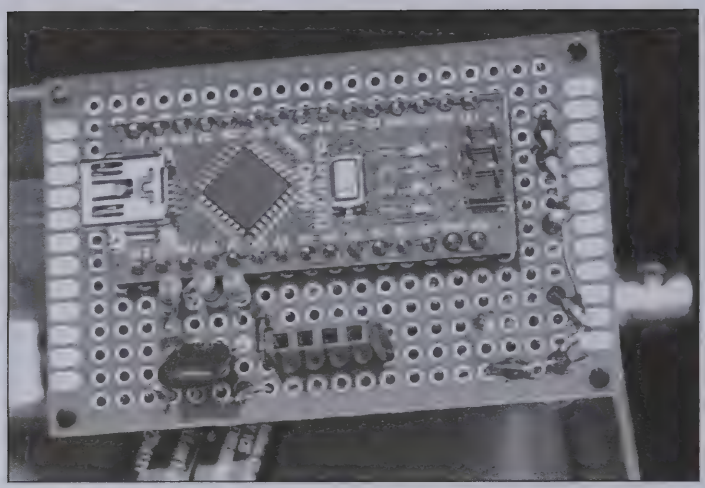


Figure 37—Front of development board with 4-pin socket to connect with display.

devoted to the 150W dummy load, but there is important information here about the circuit and program code.

Since they describe the circuit and process in their article and linked material, I will not describe it here. However, there are two changes that will need to be made in the program code ("sketch" in Arduino-ese). As the authors say, you'll need to substitute the actual measured resistance of the resistor array, replacing the figure in the line MYDUMMYLOADOHMS. Second, they suggest a figure for the "calibration offset" that may need to be "fine-tuned" for an accurate readout. I found that the figure in the CALIBRATIONOFFSET line was not accurate at all for my application, and I couldn't get their formula for finding the correct figure to work (but my math skills are rusty). The figure that works for me is .01150, but your mileage may vary.

Both of these meters have their own uses. The QRPoMeter is the most accurate and provides both power and SWR. The Nano-based one, however, is much smaller and handier for portable use or for a quick check or simply a dummy load in the shack or field.

References

1. https://sites.google.com/nm0s.com/home/qrp-kits
2. With the WM-1, at least, I have found it necessary to calibrate borrowing a friend's Bird wattmeter as the voltage method described in the user manual results in considerable inaccuracy.

—DE K4LXY

The Fine Print

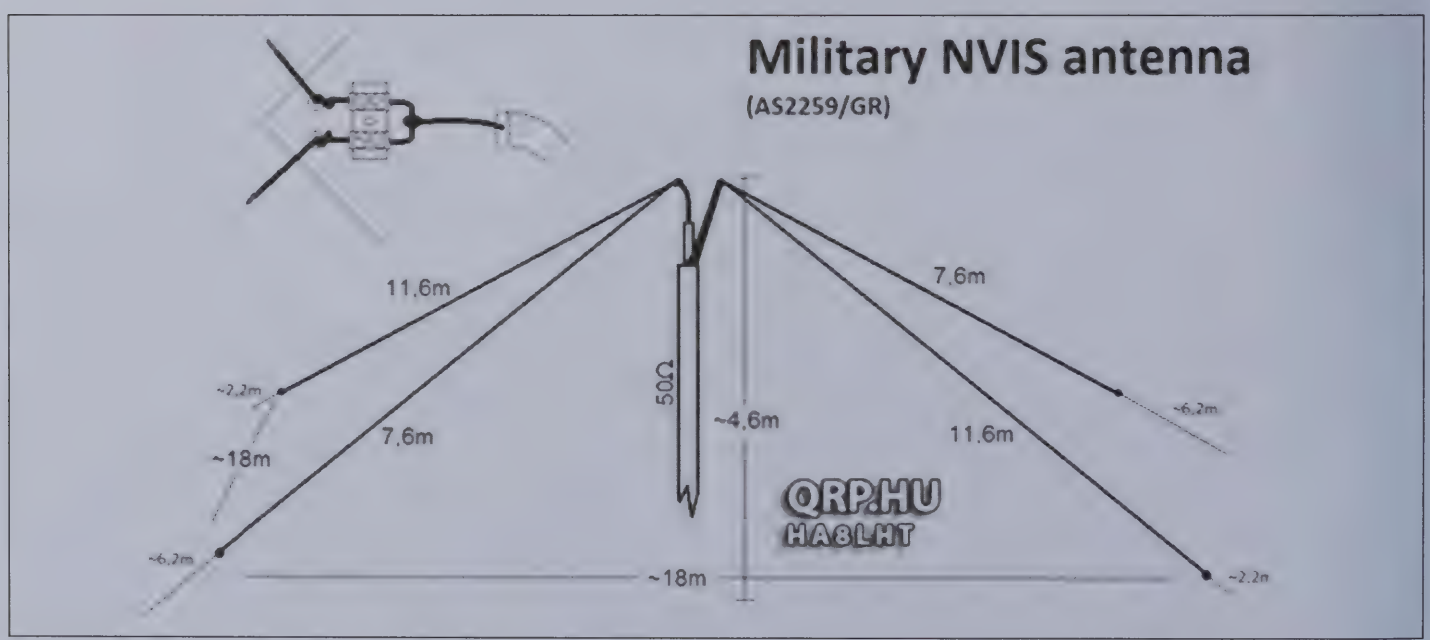
The usual rules apply; send your ideas and projects to me any way you can get it here (e-mail, snail mail, 3 1/2" floppy disk (if I can still find my external drive), CD, handwritten on a napkin, etc), or tell me where you found something good on the Internet. My addresses are 7945 Citadel Drive, Severn, MD 21144, and wa8mcq@verizon.net.

If you have something of interest and aren't sure just where it should go in the *QRP Quarterly*, send it to whichever member of the editorial staff you think is best, and they'll pass it along to someone else as appropriate.

Important note—when you send me something, you must get an acknowledgement from me. If you don't get one, either it never got here or I overlooked it. (Although very rare, both have happened.)

Well written, Pulitzer Prize quality articles are nice, as are computer drawn schematics, but don't worry if you can't do all that. We'll take care of the rest, editing, redrawing, etc. The readers are waiting!

●●



I suggest the dipoles be made for 40m, 60m or 80m — pick two. Use #24 Teflon wire and use the 20 foot pole I used above. Or leave as is and use your tuner to match it to your band. It will cover 80m to 30m no problem! *—de HA8LHT/QRP*

FDIM 2019 2N2222A Power Challenge

Dave Cripe—NMØS ai9e_qrp@yahoo.com

A new event at FDIM received a great deal of interest this spring. The 2N2222A Power Challenge is a cometition with the goal to obtain the maximum sustained power from a 40M amplifier circuit employing two, 2N2222A transistors as the only active devices. This year, the amount of thought, skill, and engineering talent that went into each of the six circuits entered was evidence of the level of interest this challenge has prompted. The variety of cooling techniques employed ranged from ice water, to dry ice, to massive copper blocks.

The competition began with each contestant setting the voltage to their circuit from a variable power supply, and then watching the power output over the next minute. The first contestant, David Wendt VE3EAC began his trial with an icewater-cooled circuit producing 4.13 watts, which failed 5 seconds into the run.

Steve Weber KD1JV begain his trial, and his circuit was successfully able to produce 1.0 watts for a full minute.

Four other contestants tried their circuits, which either failed, or were unable to exceed 1.0 watts.

At the last possible moment, Dave Wendt reappeared with his repaired circuit, which amazingly produced 1.97 watts for a full minute!

The level of accomplishment of these circuit designers is amazing when one considers that each of them surpassed the record set by last year's challenge of 0.28 watts.

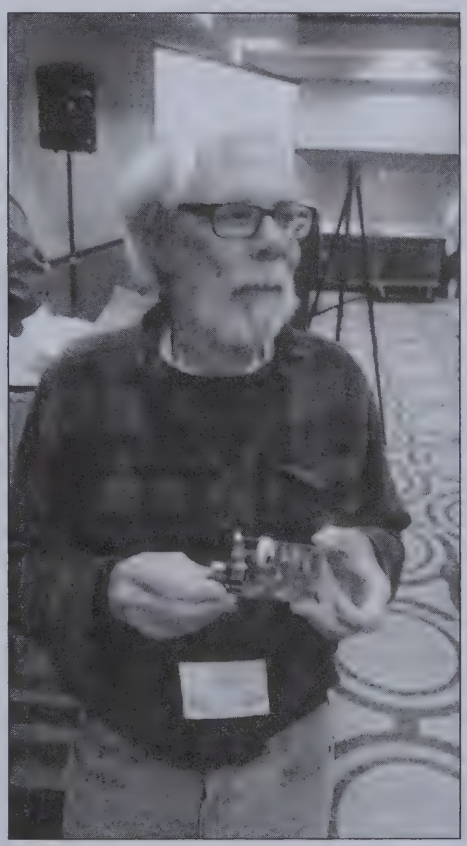
David VE3EAC was awarded a certificate and possession of the 2N2222A Traveling Trophy for 2019.

I look forward to seeing what our community can come up with for next year's challenge!

73, Dave Cripe NMØS.

●●

Mert Nellis WØUFO adjusts the bias on his amplifier.



Steve Weber KD1JV with his second place entry

David Wendt VE3EAC with his winning entry. Congratulations!

The most common reasons for missing an issue of *QRP Quarterly*:

1. Forgot to renew your membership/subscription
2. Forgot to notify the club of your address change (long ago, so now the forwarding order expired!)

So... check your membership status on the club website!
— www.qrparci.org —

YASNA: Yet Another SNA

Dave Rajnauth—VE3OOI

Let's start at the beginning for those may not understand what a Scalar Network Analyser (SNA) and why its useful. First let me say that I am a relatively new comer to this wonderful world of radio and RF. For me, the need for a SNA was realized when the homebrew group at my club, the Peel Amateur Radio Club, decided to build the LBS ("Let's Build Something") transceiver published by Pete Juliano (N6QW) in *QRP Quarterly* V56 in 2015. Club members would build the radio one module at a time over several months. This was the first radio I have built from a schematic and prior to this I had build a Bitx20 kit from Sunil Kumar Lakhani VU3SUA in 2013.

During the build of the LBS radio, there were band pass filters, low pass filters, crystal filters and other bidirectional amplifiers that I needed to build and test. This was quite an undertaking for a ham radio newbie. I realized that I could use the Si5351 as a signal generator and also use the infamous AD8307 logarithmic amp as a detector based on that milestone article published by Wes Hayward, W7ZOI, and Bob Larkin, W7PUA in *QST* June 2001.

I quickly whipped up a crude device that I called a RF sweeper. It basically programmed the Si5351 to output a frequency that was fed into an LBS module and the output of the LBS module was measured by the AD8307 log amp. I would manually take readings and plot the results in Excel. This help me tremendously to figure out how well a module was working. If you search the internet you will find that this technique has been used by many radio builders including Ashhar Farhan (VU2ESE) in his Sweeperino.

What I stumbled across was a Scalar Network Analyser which is the younger brother of the Vector Network Analyzer (VNA). There are a number of scalar network analyzers (SNA) from various electronics kit suppliers as well as ham radio pioneers, bloggers and experimenters. A quick search on Google will provide links to a number of SNA projects.

These devices (see Figure 1) feed a known reference signal into a device under test and then measured the emitted signal. The major difference between the two is that a VNA measures amplitude and the phase of the emitted signal relative to the input reference signal where as the SNA only measure amplitude. The SNA is therefore a useful device for characterizing devices to identify characteristics such as bandwidth and insertion loss.

With a return loss bridge (see figure 2), its possible to measure SWR over a range of antenna frequencies.

The Peel Amateur Radio Club (PARC) has been organizing buildathons for over 12 years and has hosted over 21 buildathons. These buildathons and any associated kits, schematics and software are available to members. In 2017, the club decided to build a SNA and with my experience building a crude SNA I was invited to assist in the development of the hardware and software for the project. The initial main features were to characterize filter and to measure antenna VSWR. The most important requirement was to keep it simple (stupid) — KISS. Anyone should be able to pick up the device and figure out how to use it with very little assistance.

There were quite a few engineering challenges we had to solve for the SNA. The first was the signal source. We could use the beloved Si5351 PLL however this generates square wave which is full of harmonics. Depending on the device you are testing, this could produce undesirable results. We decided to use the AD9851 DDS. This also had challenges because the output signal power varied with frequency. Careful measurement of output impedance and signal strength had indicated a significant variation with frequency. We opted to use a 50-ohm pad, a Mini-Circuits Monolithic Microwave Integrated Circuit (MMIC) MAR-6SM amplifier and a low pass filter to clean up the output and get a 50 ohm output. The layout of the generator

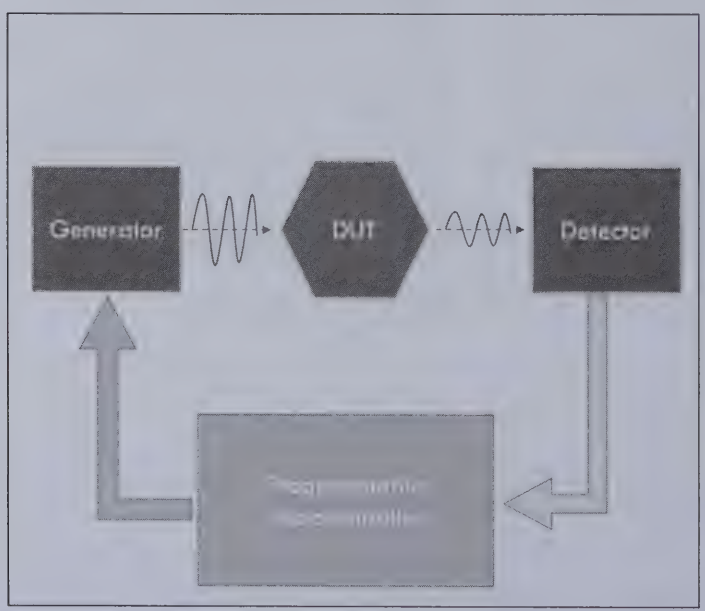


Figure 1—Network Analyzer layout.

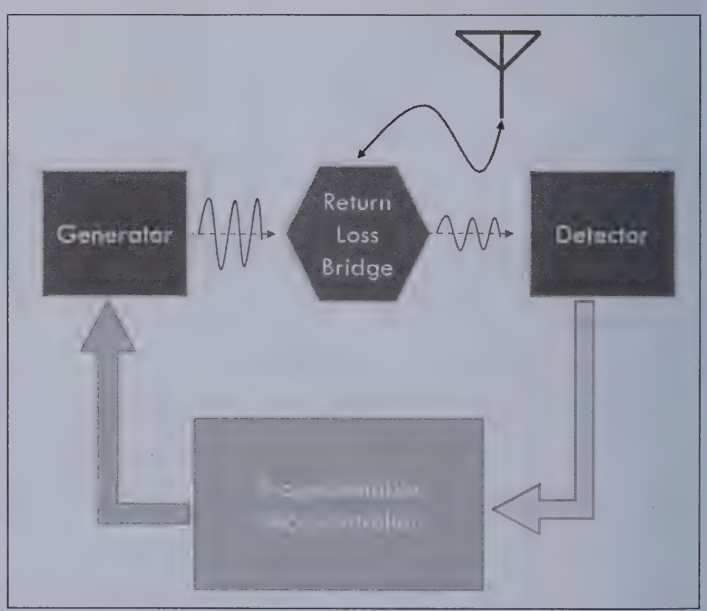


Figure 2—SNA with a Return Loss Bridge.

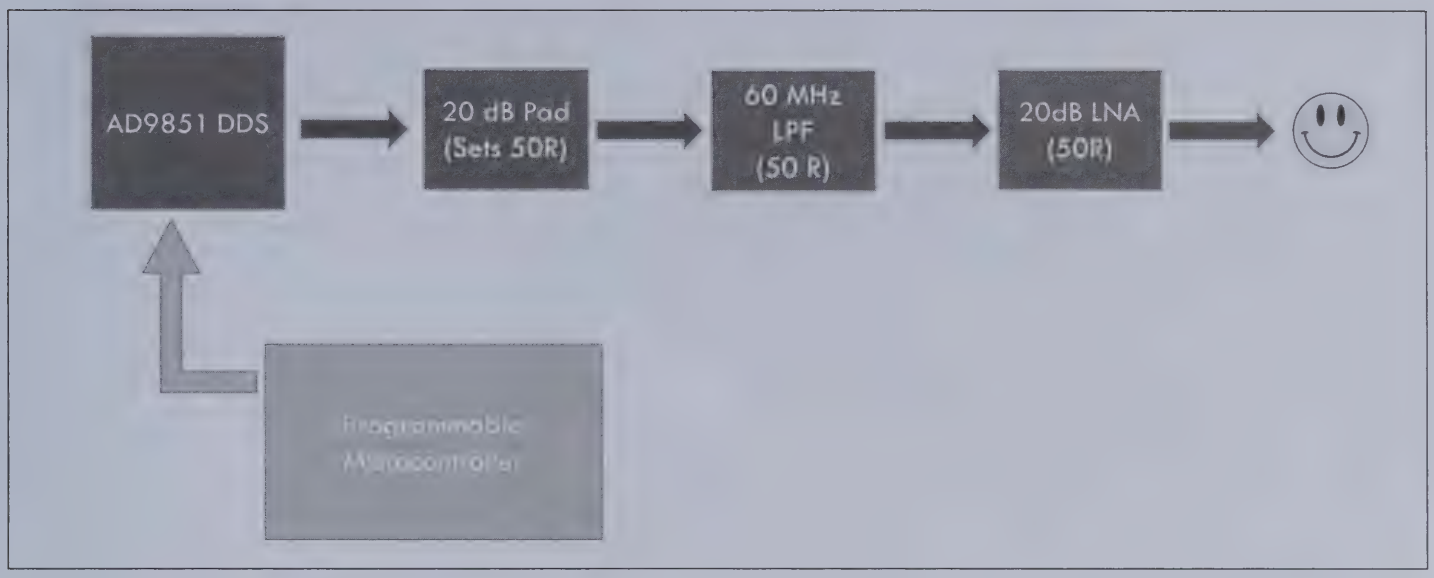


Figure 3—SNA Generator layout.

is summarized in the Figure 3.

The detector was much easier to build since its was based on the AD8307 as a 50-ohm power meter as detailed in Wes Hayward's article. We found that with shielding around the AD8301 we could measure signals between -70 to -75 dBm where the noise floor would allow such measurements. We found in real life circuits where noise is a reality, measurements between -50 to -60 dBm were possible.

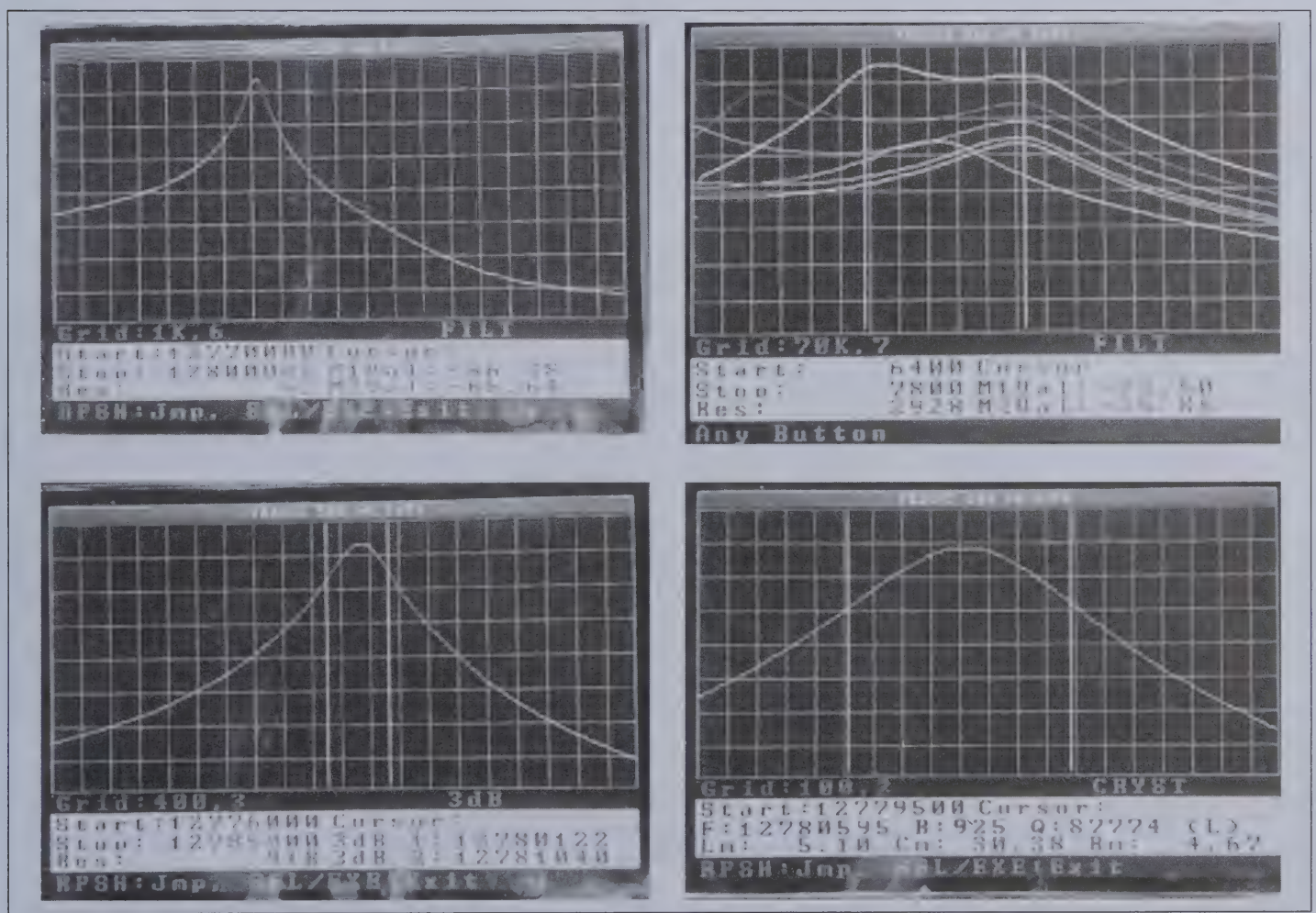


Figure 4—Sample SNA output plots.

Figure 5—Final SNA from Buildathon.

We decided to use an Arduino Mega and a 3.5-inch colour TFT display. We used the Mega instead of a higher performing microcontroller such as the STM32 because many of our members were relatively newcomers to the world of microcontrollers and PARC homebrew group agreed that the Arduino Mega would be much easy for them to play with in the future.

To keep this simply to understand and use, we decided to use two push buttons and a rotary encoder. The push buttons were use to select features or execute functions. We could have used fewer control inputs but we felt this would make the SNA more difficult to use.

After a prototype for the hardware was built, we turned our attention to writing the software. To make the software easy to use, a simple menu system was developed to allow access to various function and features. These functions include:

- Characterizing filters with automatic –3 dB identification
- Measuring crystal motional parameters
- Return Loss measurement
- VSWR and antenna tuning
- Generate single or multiple sweeps (overlays)
- QRP RF Power Meter
- Signal generator
- Ability to calibrate the SNA using simple to follow procedures.
- Ability to save and recall sweeps or scans that are stored on the SNA itself.
- Ability to access the raw data that can be further analyzed in programs such as Excel via the command line interface (CLI).

The SNA has the ability to generate various plots on the TFT screen and a few notable plots are shown in Figure 4.

Readers should note that additonal hardware is necessary to measure crystal motional parameters, return loss and SWR.

To assist our members with the use of the SNA we developed:

- A step by step build document to guide buildathon members;
- YouTube usage videos demonstrating each function;
- A user guide for general or common usage; and
- An advanced user programming guide that gave an overview of the software and the command line interface.

After the hardware was finalized, we had created a PCB layout that would be submitted to Gold Phoenix in Mississauga, Ontario for fabrication. For the buildathon, we ordered 30 boards for members that that would attend the buildathon that we scheduled for two weekends in April 2018. At the buildathon we decided to have separate test and calibration stations. Our test station had specific customer written test programs that would help us test and troubleshoot various components such as:

- Push buttons and rotary encoded;
- TFT LCD Display
- I^2C Memory use to store sweeps and configuration parameters
- AD8307 Log Amp
- AD9850 DDS
- Command Line Interface

The calibration station had spectrum analyzer and signal generators that were used to calibrate the SNA outputs and inputs.

We presented our SNA at 2018 FDIM club night. Figure 5 is a photo of the finished YASNA.

Resources:
https://ve3xr.wordpress.com/
https://parc.groups.io/g/parc-homebrew
https://youtu.be/VxO2v83q2do

●●

QRP ARCI is Your QRP club — Give it your support!

2019 Peel ARC Buildathon

Frank Roberts—VE3FAO and Ken Chase—VE3ABN

Peel Amateur Radio Club Buildathon—
The PARC Signal Generator

The yearly Buildathon was held May 4/2019 at St. Bartholomew's United Church. About 50 builders showed up to build a 3-output DDS based signal generator. The team of many kitted it out at $50. The three outputs will allow the I&Q outputs for a upcoming SDR radio.

Tools etc.

The following was a suggested list of tools and materials for the buildathon:

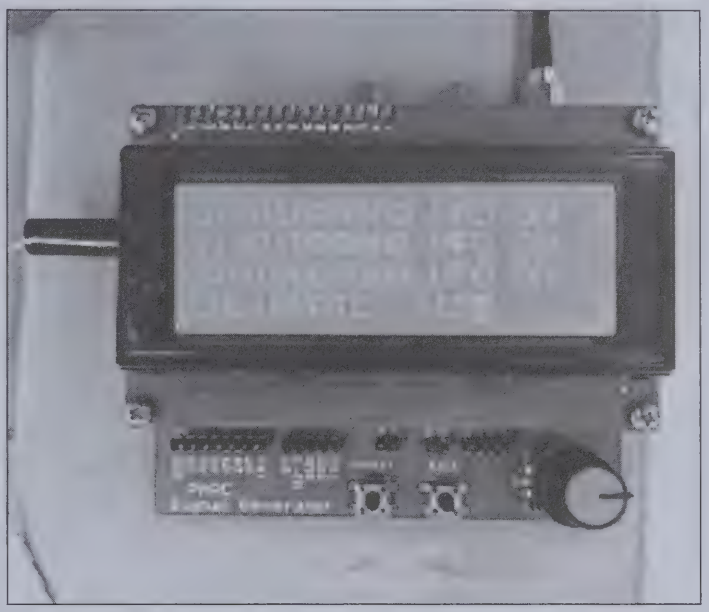
- Tweezers, Hobby knife (X-Acto or Olfa), Wire strippers, Diagonal cutters, Needle nose pliers, Small slotted screwdriver, Small Phillips screwdriver.
- De-soldering braid or solder sucker, Highlighter, Ruler (in inches), Pencil, Partitioned container for kit parts, Solder, Solder station (grounded), Magnifying glass.
- Optional: Multi-meter and PCB holder/third hand.

There was much help provided in building the generator including an acid bath station to clean up the boards and of course, a programming and testing station.

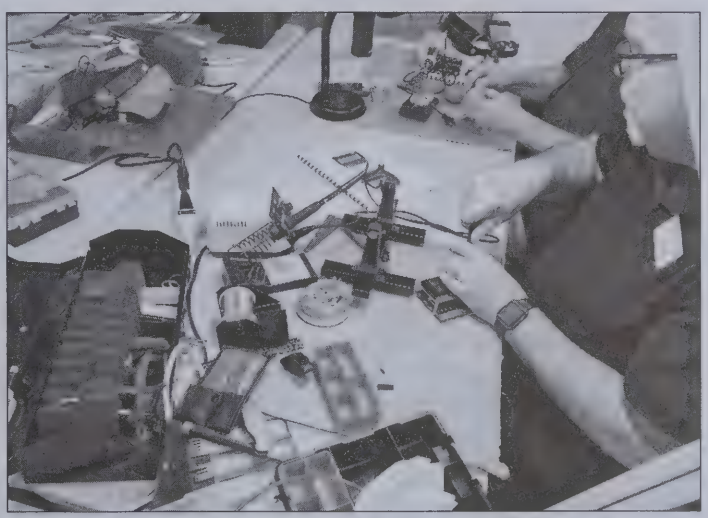
The accompanying photos tell more of the story. Also see:

https://www.youtube.com/watch?v=hxUZkSZ8yrg

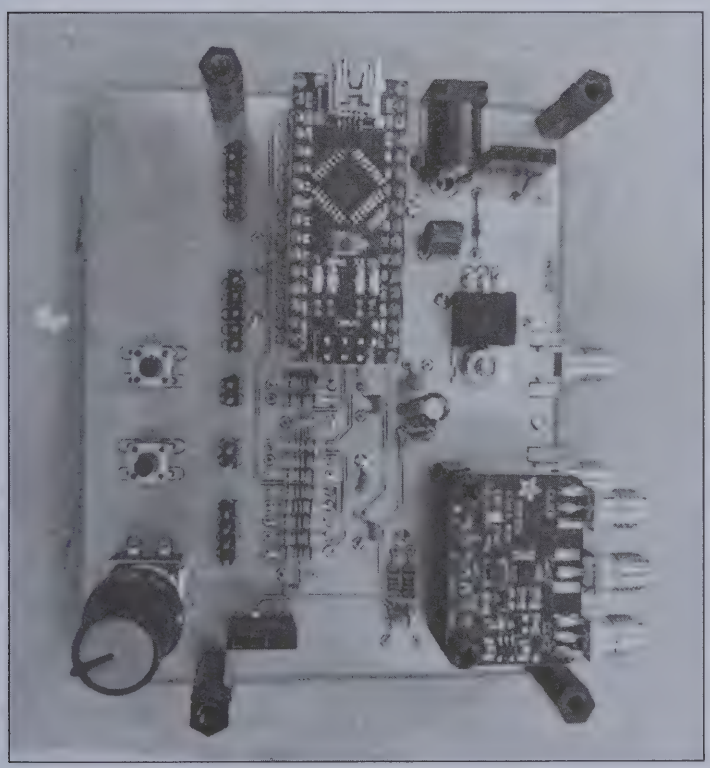
73, Frank & Ron ●●



A completed PARC DDS Signal Generator. Just 1 Hz off after calibration!



Rod VA3ON builds his out.



Prototype model of the Signal Generator.

Heads down and hard at work during the Buildathon.

Ten Questions About Your QRP Operations

John Leonardelli—VE3IPS VE3IPS@gmail.com

The simple game of ten questions is a starting point to conversation and inspiration to use what other people are using. Please share with the other readers your answers by sending me an email with your answers. Get out and operate today!

Help! I need your answers for the next issue. Send them to me at the e-mail address above. *—73, John, VE3IPS*

Tom K9CJM

Here are this month's answers from Tom Liska, K9CJM of Wisconsin Rapids, WI—

Q1: Favorite Mode: CW
Q2: Current QRP radios: Elecraft KX3, K3,
Q3: Favorite antenna in the field: Buddipole Versa Tee Vertical, SOTA BEAMS 5 band linked dipole (home brewed).
Q4: What contests: ARRL Field Day
Q5: Wish List: More mountain top QRP opportunities in WI
Q6: Operating Tips: Listen, listen, and listen some more. Perfect your timing for pouncing. Develop great patience, Call CQ when all else fails. Then listen some more. Don't be afraid to go to use DX frequencies and compete. Enjoy the SOTA operations.
Q7: Use of Tablets, Smart Phones: Smart phone for looking up busted calls. QRP & SOTA Operations
Q8: Power Choice: Batteries
Q9: Smart Phone Apps: See 7 above
Q10: First Aid Kit: Yes, and based on recent experience in a remote location, toilet paper and associated supplies for surprise events. :-)

I have worked 162 countries and have DXCC/QRP from ARRL. Love the challenge.

●●

Experiment on Tuned Counterpoise

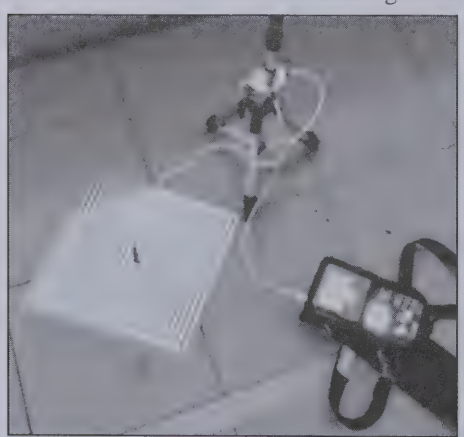
Willis LIAO—BX2AFU (BU2EQ)

After trying to build a spiral counterpoise with copper foil tape, my quest for a portable multi-band counterpoise continued. This time it was to make a foldable tuned counterpoise.

I used a 30x30 inch piece of aluminum foil mattress I bought in a local camping gear store.

I attached a thick wire to the mattress and the wire then goes to the "antenna" socket of my MFJ 16010 tuner, which is connected, via its "transceiver" socket to coaxial shield at the feedpoint of the antenna. The MFJ 16010 is a random wire tuner that utilizes L-network matching, just like most commercial and homebrew "ground tuner" (aka artificial ground) products.

Aluminum foil camp mattress counterpoise and tuner connection detail.



Spiral counterpoise with foil tape.

My tuning steps for this experiment:

1. Disconnect the counterpoise and adjust the loading coil of the antenna for maximum noise level.
2. Hook up the 16010 and the foil mattress and adjust the knobs on 16010 for lowest SWR.
3. If necessary, activate ATU for the final fine tune.

Web Resources

https://www.youtube.com/watch?v=snDmKE2tg90

https://www.youtube.com/watch?v=snDmKE2tg90

Check out NØLX's experiments with a DIY copper foil counterpoise at: http://www.n0lx.com/spiral.html

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Quartzfest 2019

Rick McGaver—NK9G

This article was one of the presentations at FDIM 2019—

Quartzfest is held annually in Quartzsite, Arizona about 130 miles west of Phoenix Arizona in the month of January. This is a week long Hamfest billed as a ARRL Special Convention which was held January 20 - 26th, 2019, it's 22nd anniversary. This event is held in the Sonoran Desert on US 95 about 7 miles south of the city proper on Roadrunner BLM (Bureau of Land Management) land. The Hamfest coincides with the Quartzsite RV Show and the Rock and Gem Show.

The Hamfest is boondocking at its best. No electricity, no water, no toilets. Port-o-potties are supplied for tent campers. You have to ask yourself, Would I be able to survive under these conditions. Of course, 1000+ attendees did this year. If Emergency Prepardness is your thing or not, this is a real test for your radios, antennas and equipment under some potentially difficult conditions.

Attendees come in everything from $500,000.00 motor homes to travel trailers, fifth wheels, make shift campers, vans, cars and some even do in in a small tent.

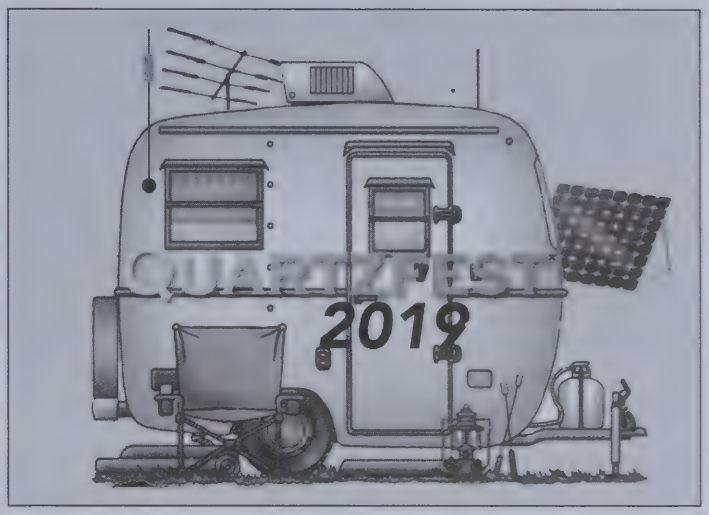


Photo 1—Quartzfest is held in the Arizona desert.

V E C Testing

V E C Testing (Photo 2) is an integral part of any hamfest or Amateur Radio Convention today. Quartzfest provides testing right out on the desert floor for all classes of licenses. The best part of this is that the cost is zero. This year 30+ passed exams as a new ham or an upgrade.

Pot Luck Dinners

Pot Luck dinners are common here at Quartzfest. This year a beef brisket dinner was sponsored by the Western Country Cousin's Net. Only $2.00 per person, bring a "dish to pass", your plate and utensils and a comfy chair and you are ready to go. Many other smaller groups pool their resources for pot luck dinners throughout the week in their unique and special way. The friendship and camaraderie exhibited by attendees is unmatched when people come together and break bread. Photo 3.

Off Road Four Wheeling with Ham Radio

Off Road Four Wheeling and Ham Radio comes along for the ride. This year over 50 four wheel units participated in a drive up into the Dome Rock Mountains (Photo 4). The trip was about a 5 hour trek and included a stop to enjoy a picnic lunch. The leader gave a narration as they drove on 2 meters presenting history of Quartzsite and points of interest. During this week numerous SOTA operators made the trek up into the mountains in search of activating a new SOTA or just reactivating an old one. I heard many of these SOTA operations and pile ups were common.

QRP

QRP is alive and well especially at Quartzfest. Radios such as Elecraft's KX3, Yaesu's FT-817/8 and Mountain Topper's are the choice of many but some use the larger radios throttled down. The QRP ops are hard to see but look for the simple proven antennas and they are there. Whether its end fed 1/2 wave, a Buddipole, inverted Vee or a SOTA linked dipole. As QRPers we understand

Photo 2—VEC testing is an important part of the event.

Photo 3—Pot luck dinner.

Photo 4—Vintage off-road 4-wheeler.

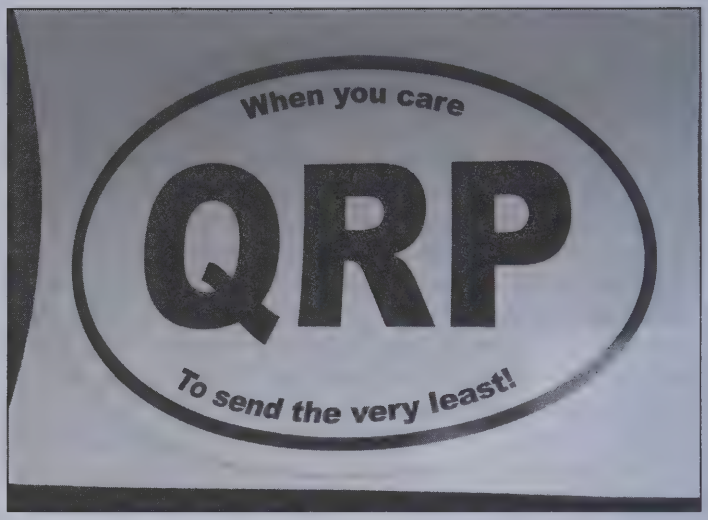


Photo 5—QRP is big at Quartzfest.

the importance of efficiency in an antenna. SOTA ops head into the mountains but many operate from their fixed position in the desert. As QRP ops we know power is no substitute for skill.

Antenna and Solar Walk-Abouts

Antenna and solar walk-abouts took place on two mornings. The leaders went out in the days preceding the walks and scoped out interesting antenna and solar installations. For antennas it can be as simple as a wire on a fiberglass fish pole, SOTA linked dipoles and inverted Vee's. More elaborate setups include Spider Beams, yagis and multiband band verticals. Explanations were given by individuals about their installation and the results they have experienced.

When it comes to Solar Power it is almost required unless you want to listen to a generator all day. Most units and campers carry batteries for electrical requirements from lights to powering their rig for portable operation. My observation was that 90% of the units use some form of solar. Quiet hours are from 10 PM to 7 AM so generator use was limited.

DX CHALLENGE

Every year some type of operating competition is part of the events. Last year it was a HF shootout on 20 and 40 meters. CW and SSB are the classes of operation and bands are 20 and 40. This was split between QRP and Low Power, up to 150 watts.

This year there was a different spin put on the competitive spirit with the sponsorship of the The Northern Arizona DX Association. The DX Distance Challenge was to make DX contacts with QRP or low power on the band of your choice using CW or SSB. The object was to see who could make a contact the furthest away from the Quartzfest site.

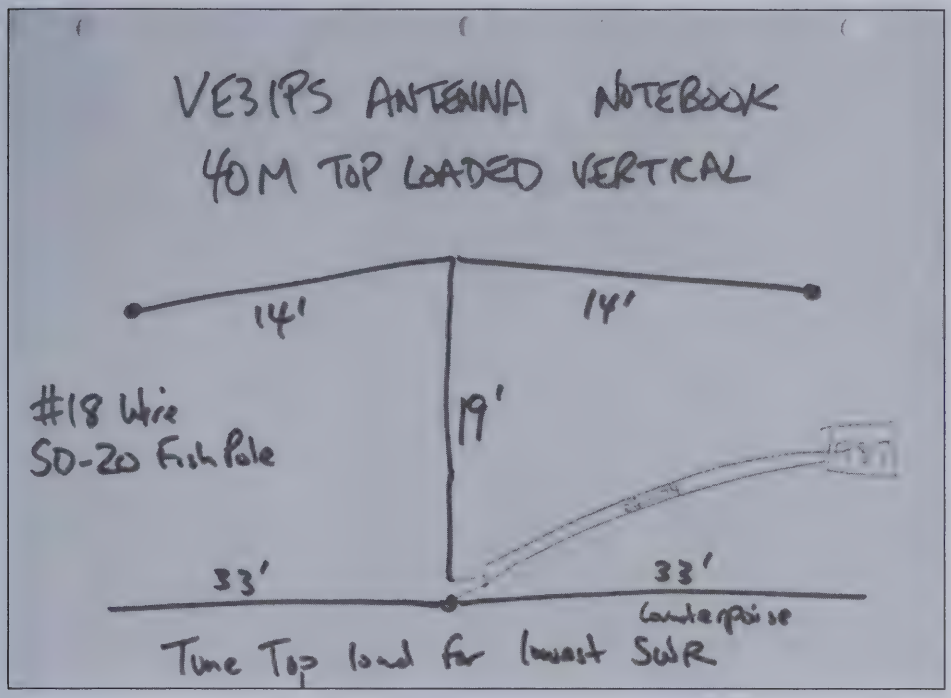
Commercial sponsors for the DX CHALLENGE were DX Engineering, QRZ.COM, *CQ Magazine* and GigaParts. ●●

Photo 6—The antenna and solar tour.

Photo 7—Award for the DX Challenge competition.

Antenna Notes

John Leonardelli—VE3IPS VE3IPS@gmail.com



40m Top Loaded Vertical Antenna

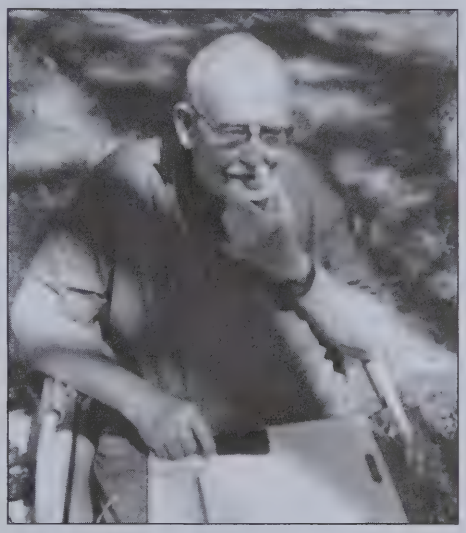
This is a simple antenna to build on a rainy Sunday afternoon. I used some lightweight #24 Teflon coated wire and a 20 foot Shakespeare fishing pole.

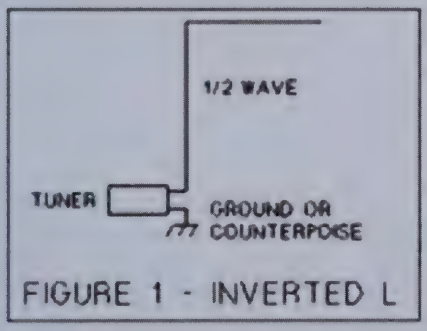
I drove out to a local park to try it out and had a quick QSO with WA1WCC Special Event station on 20m using 10 watts SSB with a 5 by 9.

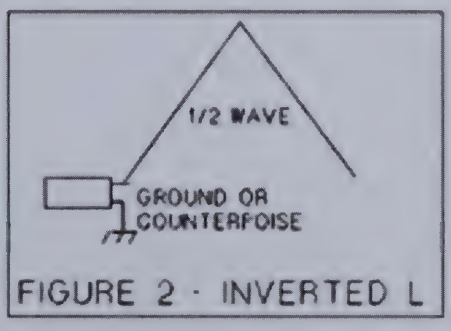
N2CX Halfer

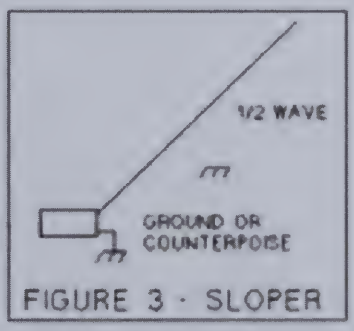
Halfer performance approaches a center-fed resonant dipole. The antenna requires a tuner.

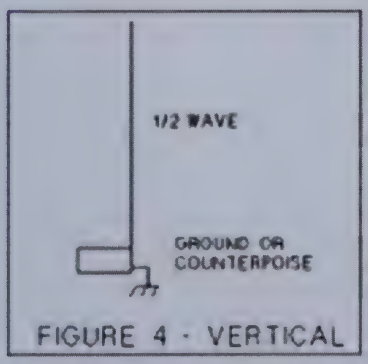
Joe, we will miss your contributions, antenna experimentation, and field op reports. You unknowingly inspired many hams over the years to build, test, operate all the time. I still have my Badger from Atlanticon.

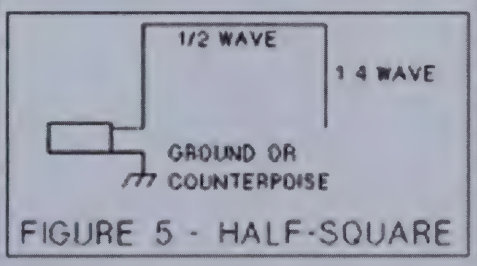


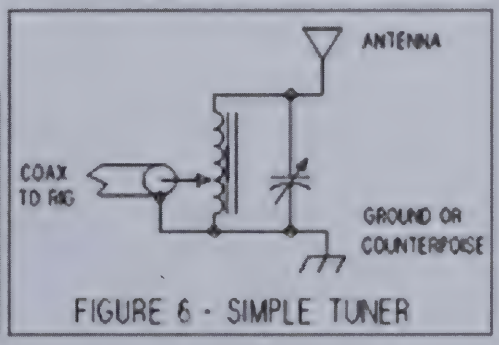












The Joe Everhart N2CX Halfer cheat sheet

Stable Support for the Buddistick

Bob Thompson—K5RWT thompo@sbcglobal.net

The Missing Link

I love BuddiPole, in particular their BuddiStick, which like most users, I have added pieces and parts until it can do everything but wash the dishes. Since parts and accessories are interchangeable with the BuddiPole, my BuddiStick only slightly resembles the original. BuddiPole has made their reputation by working with their users to provide a versatile family of antenna parts that allow every user to built own version of many different antenna styles.

So, what in the world could users want that they don't already have. I can hear a chorus of BuddiStick users worldwide saying, "a stronger support fixture for the BuddiStick!" The little piece of metal provided works fine with a light simple antenna. It provides a proper connection to the coaxial cable and to radials. It easily connects to photo tripods, clamps and such… BUT that little piece of metal starts to let the antenna sway and actually bends with use.

The time has come to develop a stronger support. Time to research re-purpose resources that can solve this dilemma. Off to Home Depot and Lowes. In their electric departments, we found a 3/4" conduit fitting that had connections we could use for 1/2" pipe support, ground/radial connection and antenna placement. The flat plate on it's side provides an excellent location for a SO-239 or BNC fitting.

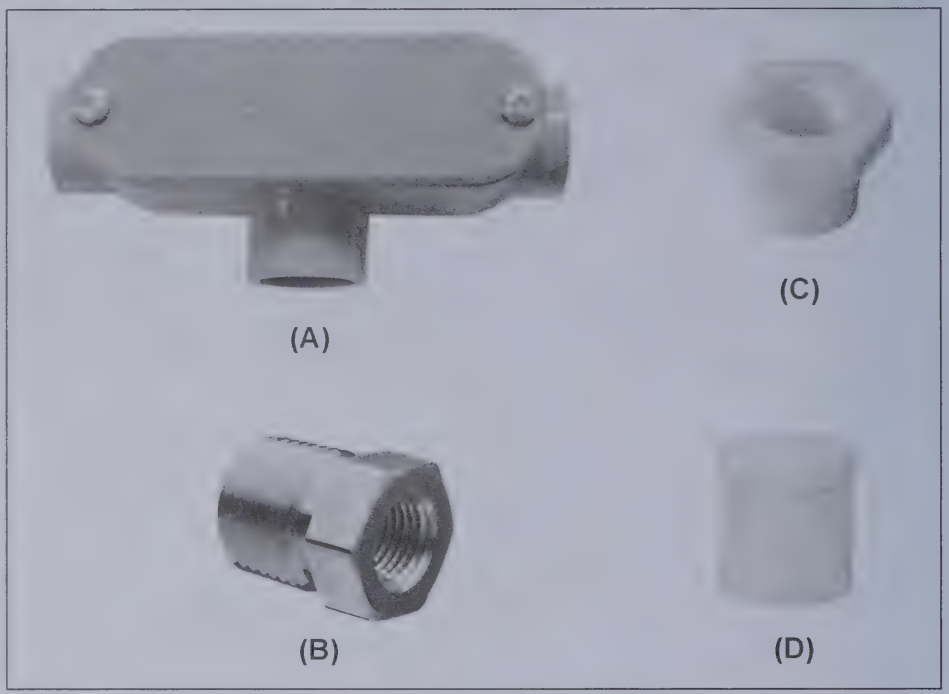


Figure 1—(A) Conduit Body 3/4 "; (B) Brass Pipe Fitting, Reducing Hex Head Bushing, 1/4" NPT Male × 1/8" NPT Female; (C) Reducer Bushing, White PVC, 3/4" slip × 1/2" thread. Two of these are required; (D) PVC Pipe Fitting, Plug, Schedule 40, 3/4" Spigot.

Next, in their plumbing departments, we found 3/4" adapters to 1/2" threaded fittings. We use these in the ends of the 3/4" conduit fitting. The bottom 1/2" connection for our mast connection, and a brass bushing with 1/8" pipe threads (3/8" × 24) to 1/4" pipe thread (fits 1/2" pipe…don't ask). Really, it helps to carry things from place to place since a variety of standards exist within these stores. A 1/4" × 20 bolt fitted into a hole opposite the flat plate provides a ground/radial connection.

Okay, are you confused yet? Figure 1 is an illustrated list of the materials you need from the home improvement store.

Time to paint by the numbers! Glue

Figure 2.

Figure 3.

Figure 4—The completed adapter assembly.

Reducer Bushing (C) into each end of the conduit body (A). Glue the plug (spigot) (D) into the side fitting. Now thread the brass bushing (A) into one of the ends. That wasn't too difficult was it? Figures 2, 3 and 4 show the assembly.

Next, remove the flat plate from the conduit fitting (A) and drill a 5/8" hole for a SO-239 connection, or a 5/16" hole for a BNC connector (your choice). Drill a 1/4" hole in the spigot plug for a ground/radial connection. Wire the bolt to the ground side of either coax cable connector. I removed the brass bushing and drilled a 1/16" hole in bottom (Figure 5). Solder a wire here for the antenna connection and insert the bushing into the conduit body before soldering to the coax connection. This brass bushing has pipe threads, so the 3/8" threads are actually threaded 3/8" × 17 (tapered). As such they will take the 3/8" antenna fittings tightly, but to fully seat them use a 3/8" × 24 tap which will easily recut the threads entirely through the fitting, as in Figure 6. As always, a little oil will help and backing out every few turns will make a clean cut.

It all together and, *voila*, a sturdy connector for BuddiStick and any other 3/8" × 24 antenna.

I connect this to my BuddiPole center tee adapter and use it on my 12' and 24' painter poles.

Have a great time using this fitting. I made several and really enjoy the enhanced reception/transmission that extra 10-20 feet of added height bring to the table.

—73, Bob K5RWT

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Figure 5—Drilling the brass bushing.

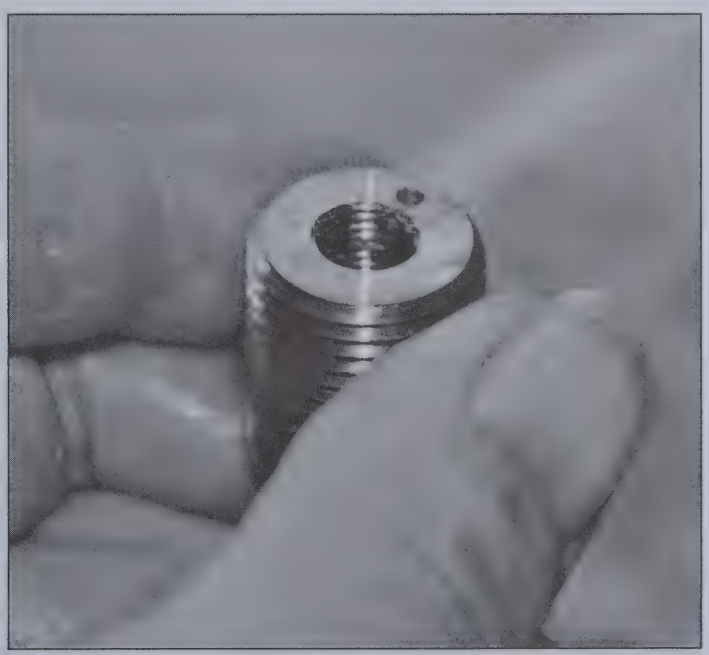


Figure 6—After drilling and tapping.

Add Some Air to Your Aerial

Bob Rosier—K4OCE K4OCE@gvtc.com

With the bands being rather poor these days, I decided it was a good time to do maintenance on my multi-band trap dipole. Some of the wire were frayed, and several of the home-made traps were in poor condition. It is designed for 12 , 30, 80, and 160 Meter.

I wasn't looking forward to winding new traps. I remembered as a kid I built a dipole by just inserting insulators along a wire (Figure 1). I had a pulley at one end so I could easily lower the antenna, and would place short clips across the insulators to change bands. It worked well, but it was somewhat of a pain to change bands.

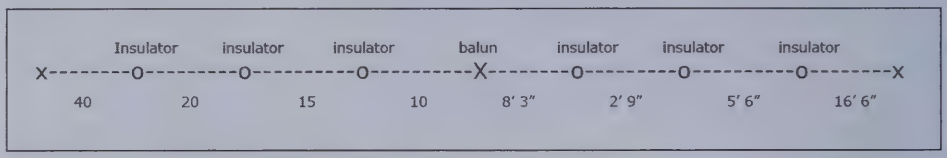


Figure 1—Diagram of the multiband antenna with clip-lead connections.

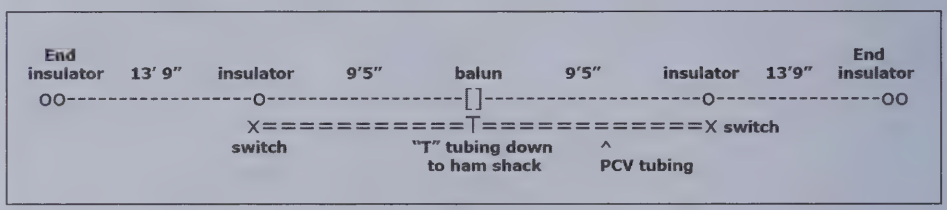


Figure 3—Diagram of the prototype air-switched antenna.

I recalled seeing a clever device that was designed to operate a Sink Disposal. It can also be used with Jacuzzi or Hot Tubs for safety reasons. If you wanted to add a Disposal to your sink, how would you turn it on or off? With just one hole drilled in the counter top, the plunger unit can be mounted. Then a push of this plunger would send air through a plastic tube and operate a latching switch. A second surge of air would open the switch back up. Sounds like this could be used on a dipole like the one mentioned above providing the electrical isolation required. (See Figure 2).

Priced at just $4, I decided to give it a try. As a prototype, I decided on a two band antenna for 12 and 30 meters. I found that the plunger provided with the kit worked up to about 20' of tubing, but as I expected, it didn't work through the 100'. I cut two pieces of tubing to 10' to reach the insulators on each side of the balun. I have a pulley on top of my tower to pull up the dipole. The remaining 80' of PVC tubing was plenty long enough to reach the ham shack from the top of the tower. The idea is to use these switches to short or open the insulators located on each side of the feed line. The 100' of PVC tubing only weighs about 1 pound, lighter than a couple of traps. And, you don't have to worry about the "Q" or the resonant frequency. Figure 3 is the diagram of the prototype.

To indicate which position the switch was in, I added a third air switch in the ham shack (seen in Figure 4). I attached a battery plus an LED which will illuminate when this switch (and the two remote switches) were closed. Being closed meant the entire antenna was active which would be the 30 meter position. I thought I would always "push" off the LED when not in use, not only saving the battery, but I would also know that the antenna was left in the 12 meter position (the shorter section). The small hand pump in the picture proved to be reliable and it operated all three switches every time. The tubing leaving the picture on the left goes to the antenna (Figure 5). In this view you can see the "T" where the PVC tubes go out to the insulators on either side of the balun. Electrical tape doesn't stick well to the PVC, so I recommend using 4" black cable ties. Be sure they are "UV Protected", and don't pull too tight. You don't want to squeeze the UV tubing.

Figure 6 shows one of the junctions where the switch is connected to the insulator.

The switch unit itself was fairly well

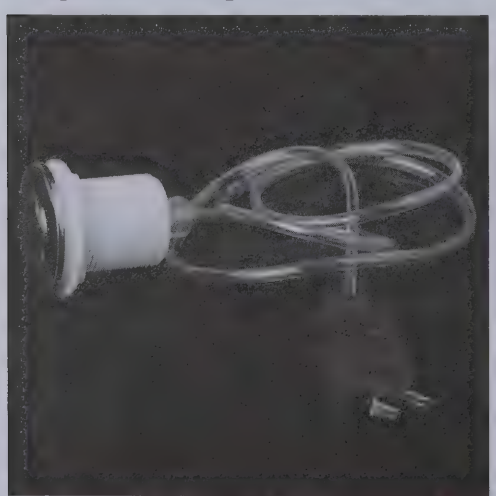


Figure 2—Air-operated switch.

Figure 4—Air-operated indicator light.

Figure 5—Tubing junction at the center of the antenna.

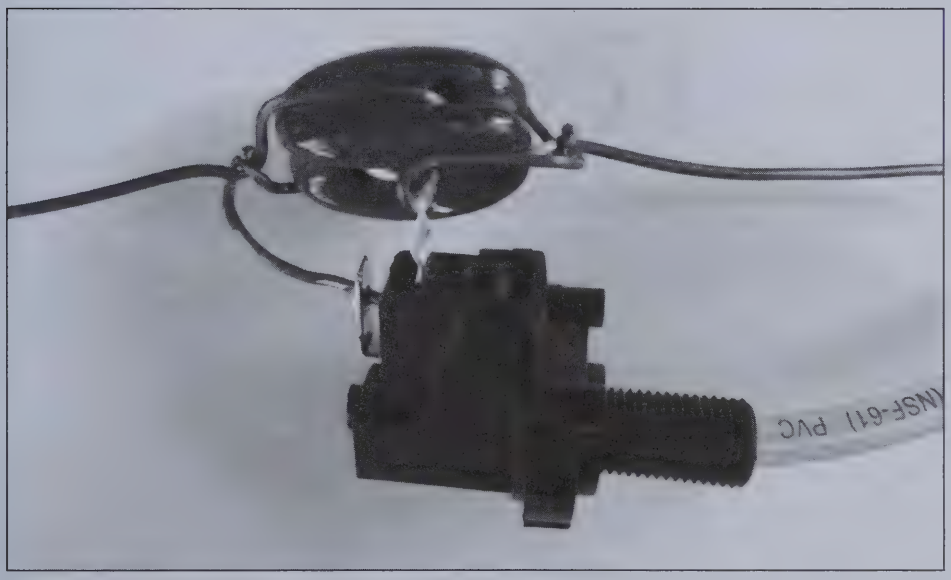


Figure 6—Here's how the switches are connected across the insulators.

sealed, so I decided just to add some liquid tape to the two wire connections. I used black tie wraps along the antenna wire to fasten the PVC tubing.

Even at 5 watts, the voltage at the ends of a half-wave dipole can be high, over 100 volts rms. The switches are rated at 250 volts rms, 15 amps, so power levels less than 20 watts would never be a problem. There are a lot of unknowns. Temperature, humidity, altitude, physical shape and spacing of the switch contacts all can play a role. Being sealed, we can eliminate humidity. So, at what power level will the voltage be high enough to arc over the switch contacts? Rather than taking one apart, I decided I would just raise the transmit power to see if this system will work at higher powers. Maximum capable power in my ham shack is 50 watts, and the antennas worked fine at this level. I learned as a kid that the voltage at the ends of a dipole was the highest, so one day I climbed the tree on the street where one end of my dipole was connected, and taped a neon tube to the antenna. I remembered how cool it looked to see the neon following my CW signal. The next morning I saw a Electric Power Company truck with the driver looking around in the trees.

I thought I was in a bit of trouble. He soon left and I climbed the tree and removed the neon. I thought using some small neon tubes could be a way of showing which section of the dipole was active. I had a couple of small 10" long neon tubes so I attached them to the prototype antenna, one at the end of the 12 meter section, and one at the end of the 30 meter section They light up when I reached about 15 watts. Obviously I don't recommend this method especially if you have neighbors, but it did indicate which dipole was active and it was fun to watch, and brought back those mischievous days of yesteryear.

I finally realized that there was a much simpler approach to determine which band was active. All you need to do is turn the transceiver to the band you want, then give the pump a few pushes and choose the louder signal. Works just fine every time. By the way, the total cost of prototype was around $30.

If I decide to add 80 meters and 160 meters like my original dipole, I would have to run two more PVC tubes to the antenna. I then would have to use three switches and three LEDs at the ham shack to indicate the bands.

Assuming "1" as ON, "0" as OFF, then all light (111) would be for 160, (110) = 80, (100) = 30, and (000) = 12 meters.

I hope that one of my ham buddies will come over to the house soon so that I can demonstrate the fact that my received signal can be much improved merely by pumping a little Air into my Aerial.

[*Bob, this idea really "pumps me up" —Editor*] ●●

Send YOUR clever idea to the *QRP Quarterly* editors!

They will help you tell the story so you can share it with the avid QRPers who read *QQ*.

See the staff list on pg. 3.

The "Merry Christmas Rig"

Walter Legan—KA4KXX

I call it the "Merry Christmas Rig"— but you can enjoy using it every day of the year!

One of the most neglected objectives in homebrew projects is Utility, or building something you can actually get a lot of use out of, for years to come. Like many of the gifts given at Christmas, very often hams build things that are cast aside just a few months later.

However, with this Merry Christmas Rig I present a 5 watt (easily upgraded to 12 watts) single-frequency transceiver that operates on the only HF frequency I know where it is possible to make a CW contact every morning, all year long. (Except from the West Coast—see the Sunrise Net invitation below.)

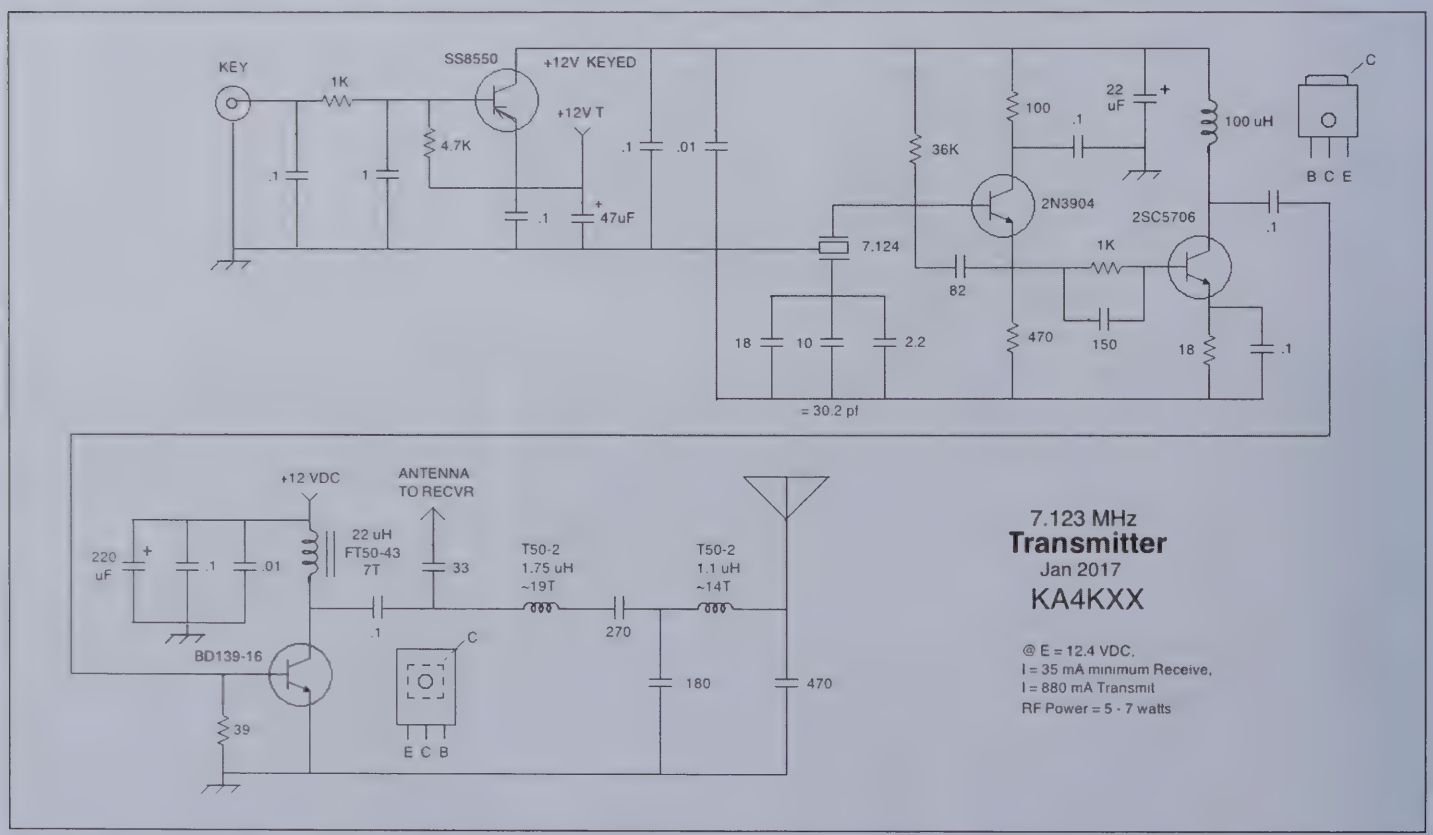
The first photo shows the entire transceiver, with enclosed battery, antenna connected on the left, and connected on the right is my favorite CW key, a simple micro-switch mounted in a balsa wood (or foam) block.

Also mounted on the left side for best ergonomics is the receiver volume control, with the only other controls being the On/Off and Transmit/Receive switches on the front panel. Just add a 40 Meter resonant dipole to the picture and the station is complete—all you need for great CW fun every day!

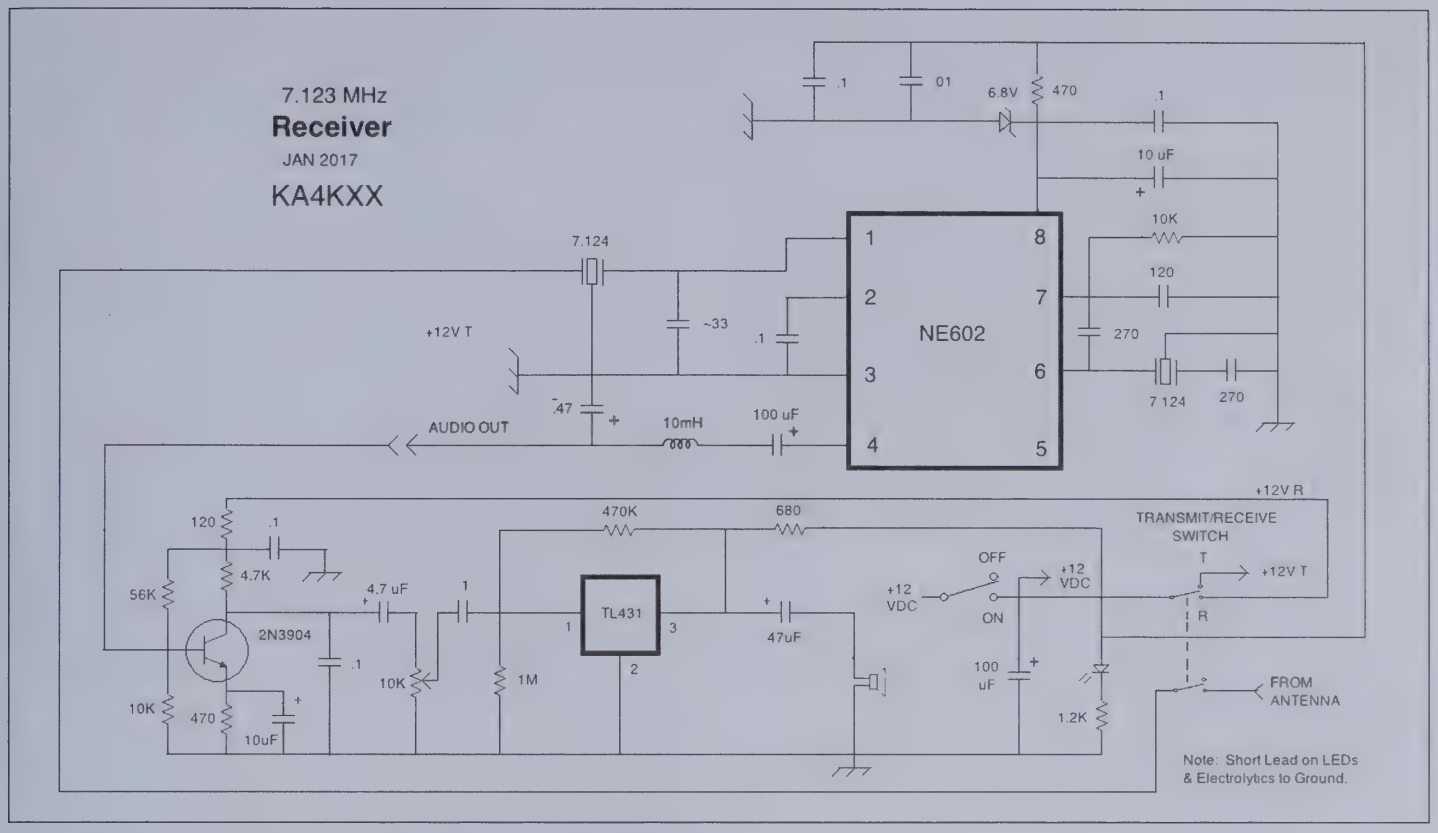
Since my CW Net friends know I run QRP they are quick to relay for me, so five watts is usually plenty of power. However, if you want to give yourself a little more pop, by simply adding a second RF power transistor in parallel and increasing the power rating of the emitter resistor, 12 watts can be easily achieved. Creating a respectable power level with few components is possible mostly because I first tuned for maximum power with a variable cap in place of what is shown as a fixed 270 pF series capacitor in the RF output network on the schematic.

The box explains the name of this little homebrew radio!

On transmit, DC power from the audio pre-amp is removed,



Circuit diagram of the "Merry Christmas Rig" transmitter.



The receiver circuit of the "MCR".

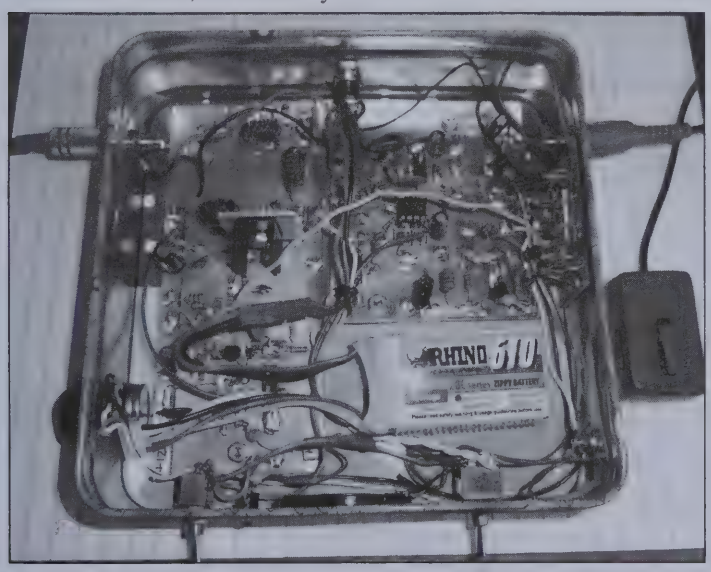
which in the two of these I have built has provided just the right amount of sidetone audio such that no separate sidetone generator was required.

The low parts count of the receiver is due to the two-component front end and the three-legged audio amp, which provides nice volume even though the speaker I used was salvaged from a musical greeting card.

Although cheap stock (from Mouser) 7.124 crystals tuned to 7.123 are illustrated, commonly available 7.122 crystals can also be made to work, or 7.123 crystals are available from AF4K.com (perhaps at a discount for quantities or youth customers).

Like all of my designs, the circuitry borrows heavily from modules originally created by others, but assembled in such a way as to meet my all my goals, including a high degree of utility!

For questions, just email me at the address on my QRZ page. ●●



Here's a look inside.

Fun & Fellowship on the SUNRISE Net

All of you are cordially invited to join us any morning starting at 1300Z on 7123 kHz and check-in (QNI) to an exciting net that has been running continuously since 1991. You will never meet a more polite bunch and we have a different Net Control Station (QNN) for each day of the week, Monday thru Sunday. We are informal rag-chewers but we start with RST, sky condition, current temperature, expected high temperature, and then go from there.

Most of the Net Controllers readily QRS and the typical speed of many of us geezers is about 12 WPM, so usually easy copy and we could use some fresh faces and fists, especially if you would like to try your hand as an occasional substitute net controller!

Especially impressive is our website at http://qsl.net/srn/ or just search for "Sunrise Net." Check-ins are logged on the website every day, it is great fun to see how often you can QNI, and perfect attendance gets your name in red!

Although most of us are located in the Southeast, we have regulars in Oklahoma, Texas, Wisconsin, and Pennsylvania. So what are you waiting for? Come join the fun!

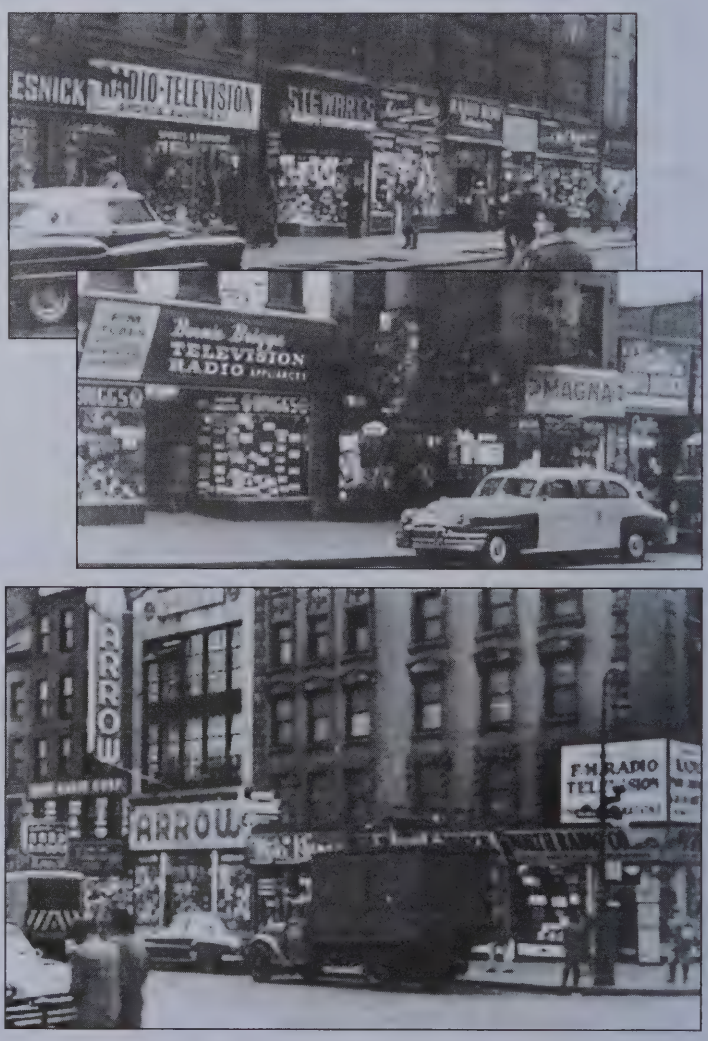
Early Radio Quiz

Bob Rosier—K4OCE K4OCE@gvtc.com

1. Who were the Tennessee Valley Indians?
2. What distress signal was used before SOS?
3. What was the other well known name for Cortland Street, New York?
4. Who started the ARRL, and what was his last call letters?
5. How many Famous hams can you name?
6. Who had a famous call sign that had no suffix?
7. What was the first "commercial" transistor available to the public and who made it?
8. What was the popular diode used as a detector in most crystal radio sets in the early 50's?
9. Why were cat whiskers used in some early radios?
10. In the Cold War era most AM radios had two frequencies on the dial marked with a triangle. What was this for, and what frequency were used?
11. In 1942, if you had a radio with short-wave, what did you have to do?
12. What is a Wouff Hong?
13. Who or what was "Old Betsy"?
14. How did the Cubical Quad antenna come about?
15. How did 14-year-old Philo T. Farnsworth, inverter of TV, come up with the idea of using scan lines across a screen to produce a picture?
16. What is the name of the cartoon character used in early *QST*s?
17. What common household item can be used as a diode?
18. Grid leak—what tools are required to stop this leak and what causes this?
19. The All American was what as relates to radio?
20. The S-38—who was the manufacturer and what was it?
21. The Sterba Curtain—where in you house would this item be located?
22. What is a grid dip oscillator used for? How is it used?
23. Lecher lines—what are they and how are they used?
24. What were the Gonset twins?
25. Why did some VHF hams use acorns?

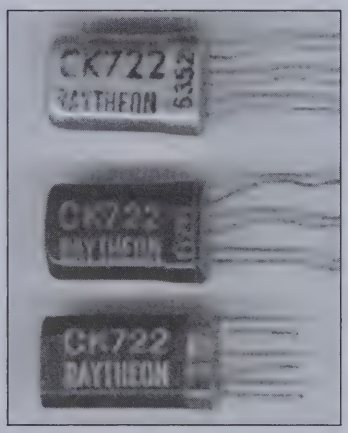
Answers

1. In the early days of ham radio, and before cable TV, TV signals were all transmitted over the airways. Many early TVs did not have sufficient filtering so ham radio signals often interfered. Since our voice could often be heard on the TVs itself, a code was used when taking about Television Interference or TVI. It was coded Tennessee Valley Indians.
2. CQD is one of the first distress signals adopted for radio use prior to SOS. It was established on February 1, 1904 by the Marconi International Marine Communication Company. "CQD" was understood by wireless operators to mean, "All stations: distress." On April 15, 1912, RMS Titanic radio operator Jack Phillips initially sent "CQD", which was still commonly used by British ships. Harold Bride, the junior radio operator, suggested using "SOS", saying halfjokingly that it might be his last chance to use the new code. Phillips thereafter began to alternate between the two. Though Bride survived the sinking, Phillips did not.
3. It was called Radio Row because it was a row of stores all having every form of electronic parts, a haven for hams who built their own equipment.

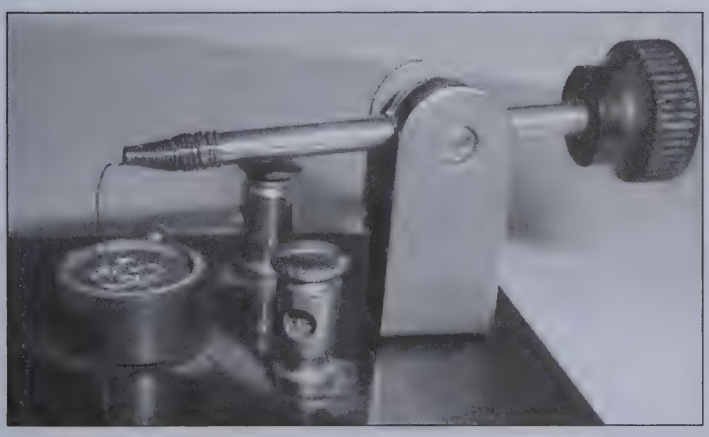


4. Hiram Percy Maxim understood that an organization was needed that would pull together the amateur radio community into a strong, self-reliant body. ARRL was formed in 1914 by a joint effort of Maxim and Clarence Tuska. Maxim's call was first 1AW, later W1AW.
5. Barry Goldwater K7UGA, Arthur Godfrey K4LIB, Walter Cronkite KB2GSD, Chet Atkins W4CGP, Burl Ives KA6HVA. Andy Devine WB6RER, Priscilla Presley N6YOS, Marlon Brando FO5GJ, Andy Griffith WA7WYV. [and many more! —ed.]
6. The King of Jordan, King Hussein, had JY1. Queen Noor also was a ham, JY1NH.

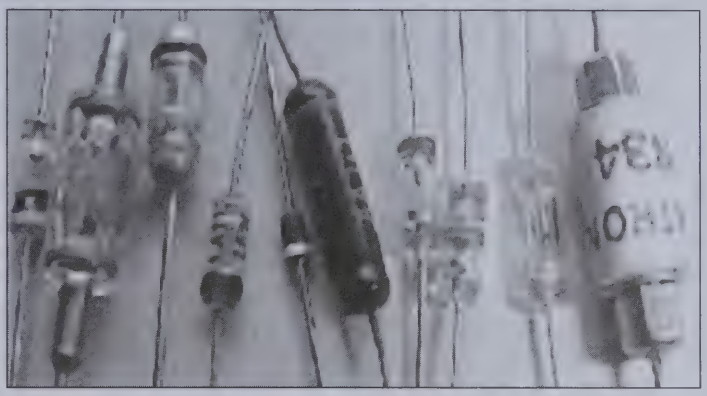
7. The Ratheon CK722. The first version was black, but the more popular high luster blue was the most popular. This was quickly followed by the GE 2N107 and the Sylvania 2N35.



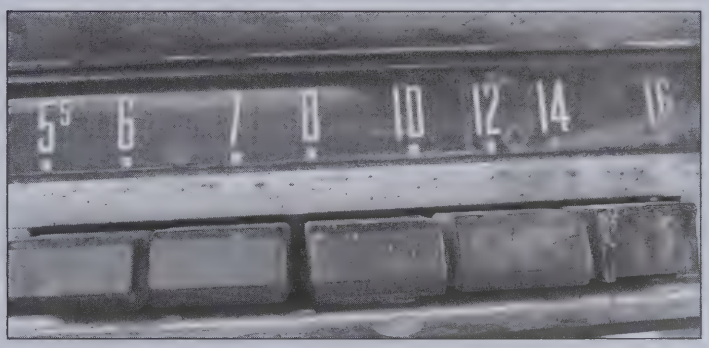
8. The first crystal radios used a chunk of Galium (Lead Sulfide) or Iron Pyrite and a springy wire that probed the material (called the cat whisker) which acted like a point contact diode.



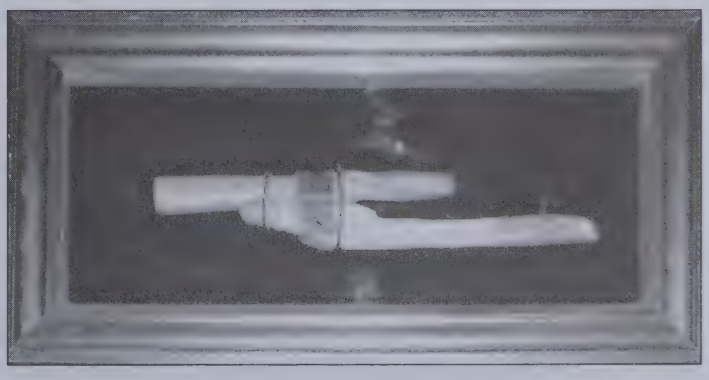
9. The 1N34 and 1N34A. Being Germanium, it took only about a third of the voltage to conduct as compared to the silicon version that came later. The 1N34 had a ceramic housing and the 1N34A that came later was glass.



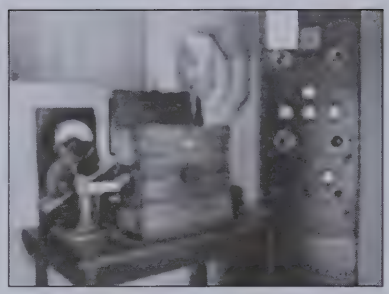
10. Conelrad (shorthand for "Control of Electromagnetic Radiation"), and it was 640 kHz and 1240 kHz.



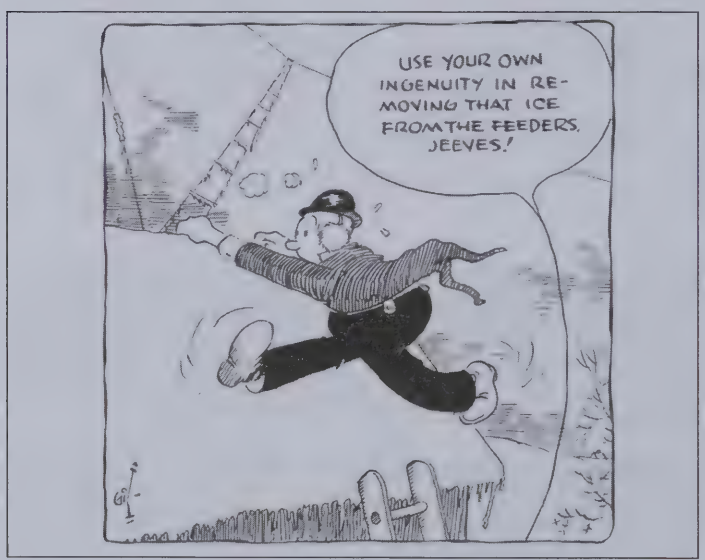
11. You had to turn it in to the authorites, or disable that portion. We had a console Zenith and the switch for short-wave was soldered in the off position
12. The Wouff Hong is a fictional tool used to "punish" Amateur Radio operators who demonstrated poor operating practices. On display at ARRL HQ today, the Wouff Hong is a constant reminder to Amateur Radio operators to be mindful of their operating etiquette.



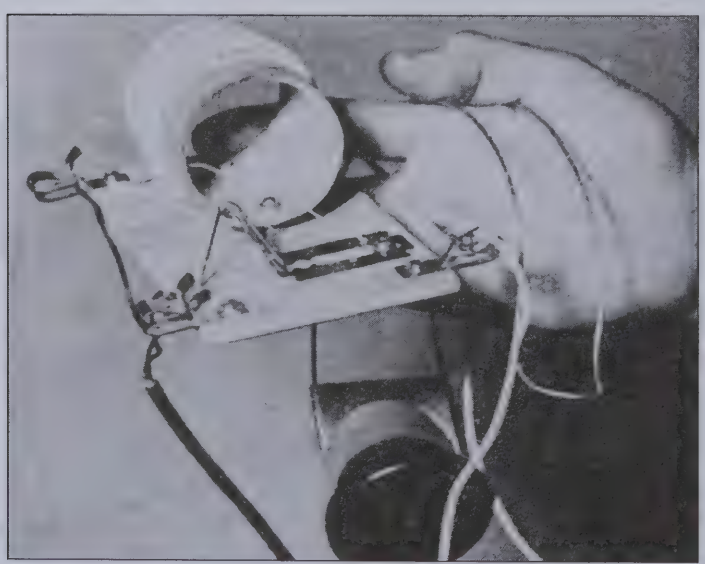
13. "Old Betsy" was the name that Hiram Maxim 1AW (W1AW) gave to his spark gap transmitter.



14. Back in 1951 a Christian missionary and engineer at radio station HCJB high in the Andean Mountains of Equador, developed a two loop antenna that he called the Quad. He developed this antenna to resolve issues caused by large coronal discharges while using a Yagi beam antenna in the thin air of higher altitudes.
15. Farnsworth was plowing a potato field, row by row when it came to him that this was the pattern needed to display an image on a screen.
16. Jeeves

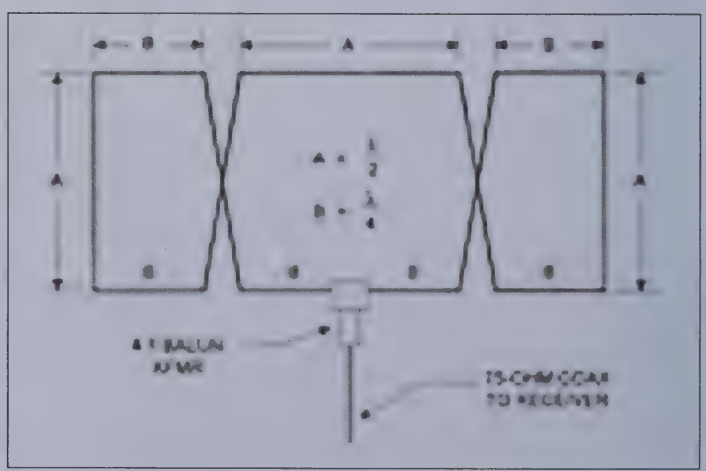


17. A blue steel razor blade has the properties of a diode and was used in crystal radios. Many GIs made them in WWII and called fox hole radios.

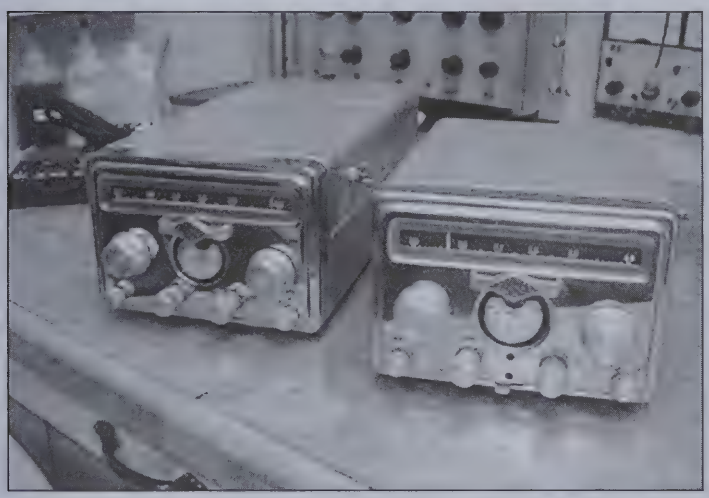


18. Grid Leak—Don't let those grids leak ! In order to function as a detector or amplifier, the grid of vacuum tubes must be a few volts negative, called the "grid bias." The combination of a grid leak resistor in parallel with a capacitor, as shown in the schematic below, allows the small current flowing to the grid to produce this negative voltage naturally. A high resistance placed in the grid circuit will permit the electrons forming the grid current to leak off after each charge thus preventing their accumulating on the grid in such numbers as to stop the electron flow from the filament.
19. All american Five—Early AM band radios were called the All American Five because all brands were made in America. The five comes from the fact that it used 5 tubes. The All American Five became a post war standard which did not fade away until replaced by the All Japanese Six, the six transistor radio made in Japan.
20. The Hallicrafters S-38 series of receivers remained in production from 1946 until 1961, an unheard of time span by the standards of today. The Hallicrafters S-38A is a superheterodyne, general coverage receiver that is used for the reception of AM and CW signals.

21. Sterba Curtains are modest-gain single-band curtain array antennas. They are named after Ernest J. Sterba, who developed a simple shortwave curtain array for Bell Labs in the 1930s.



22. Grid dip oscillator, also called grid dip meter, dip meter, dipmeter, or just dipper, is a measuring instrument to indicate the resonant frequency of radio frequency circuits. It measures the amount of absorption of a high frequency, inductively coupled magnetic field by nearby objects. It is an oscillator whose amplitude changes when near a resonant circuit that is tuned to the frequency of the oscillator. At the heart of the instrument is a tunable LC circuit with plug in coils with different frequency ranges.
23. Lecher Lines—In electronics, a Lecher line or Lecher wires is a pair of parallel wires or rods that were used to measure the wavelength of radio waves, mainly at UHF and microwave frequencies. They form a short length of balanced transmission line (a resonant stub).
24. Gonset Twins—This 1950s vintage mobile ham receiver covers the 160m through 10m bands. Receives AM, CW and SSB. This is the matching receiver to the G-77 Transmitter. Nice chrome finish. They sold for about $60.00. Gonset G-77 Transmitter 80 - 10m AM and CW with 60 watts input and VFO.



25. The small 958 vacuum tubes, aka "Acorn Tube", was an innovation in tube technology. This tube greatly eased the problem of building equipment for VHF and low-UHF frequencies during the late '30s and early '40s. This unique design attacked the traditional limitations of tubes at high frequencies by shrinking the dimensions of the elements, adopting a relatively tiny all-glass bulb, and using thick radial element leads of unusually low inductance and capacitance. The first commercial tube in the line was the 955 triode, announced in March 1935. It was promoted as usable up to 500 MHz

Black Widow Mini Vertical— It will travel anywhere!

Edward Breneiser—WA3WSJ

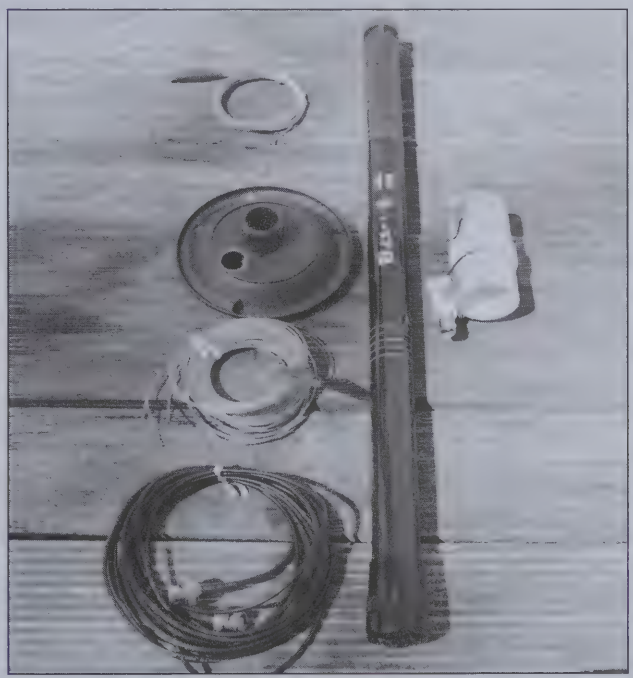
I needed an antenna that would fit in a backpack for travel on a plane or for hiking the AT. I think I finally found that antenna. This baby will travel anywhere! It works on 20m and 17m, but with a larger coil for loading other bands may be added to the antenna.

The telescopic pole slides down to only nineteen inches! It pulls out to over fourteen feet. The pole is labled as an Olympic Brand. Specs are listed below. The picture shows all the parts to this antenna.

Pole length: 19" to 14.5 feet
Pole weight: 9 oz.
Wire & coax: 6.5 oz.
Coil Assembly: 3.5 oz.
Total weight: 1.1 lbs or 1.5lbs with guys
Three radials of 14 feet each
Top radiator wire ~ 10.5 feet
Coax RG174 ~ 10 feet

20M: BW 800kHz, SWR~ 1.1 – 1.3 across band
17M: SWR 1.5 across band

https://wa3wsj.homestead.com/BW_Mini.html



De VE3IPS— I have been trying to work Ed during his field operations and never got good propagation, but after working 'Wall Street Journal' on D-star using 100mw QRP into the repeater, I may actually qualify for a QSL card. This could just about fit in a carry-on bag or duffle for airplane travel. This is the Chinese fishing pole on Ebay for $10 USD. Experiment with the coil turns to resonate on 30m or 40m but with the 14 ft radiator the KX3 tunes it up FB.

Portable Antennas in a QRP World

Joe Everhart—N2CX (SK)

Joe's unexpected passing shortly before FDIM 2019 prevented him from presenting this story. It is included in the Proceedings, and QRP ARCI is pleased to also include it in this issue of QQ. —editor

Operating QRP is always a challenge of sorts. Using lower power than the majority of radio amateurs means that you have to maximize the power you transmit. But it is quite enjoyable when you are successful. Since NPOTA back in 2016, my main operating has been portable setups in parks, now in WWFF-KFF and POTA (Ref. 1 and 2). Operating in this environment adds constraints to the way antennas can be set up and used.

Many of the parks, at least on the east coast and other densely populated areas are fairly restrictive about what is allowable. Generally you cannot simple put up antenna supports and string up wires in public areas, many parks restrict use of trees to limit damage to them and to prevent spread of diseases and parasites to them, and one must be very careful not to cause any hazards to other visitors and detract from the visual appeal of the parks. In more wide-open areas such as the southwest and in less densely populated areas things are looser, but we don't want to tarnish ham radio's public image by being distasteful or discourteous. So there is a balancing act in having effective antennas that are not disruptive. More than one portable operator has been escorted from a park for being discourteous or disobeying park rangers in setting up their stations. My primary goal has been to find solutions that can be set up and operated from a single parking space in a parking lot or along a road or field, using a car or truck as the antenna mount.

What I will be discussing is practical solutions to setting up and using HF antennas for short term HF use. Since we are in the lowest part of the sunspot cycle, the most reliable frequencies are in the lower end of HF, so the focus will be on skywires for 40, 30 and 20 meters with some hints at possibilities for 60 and 80 as well. I'll discuss a number of possible choices with their good and bad points. Some might say that choosing between them involves compromises, but I find that word pejorative

Figure 1—Drive-on antenna mount.

and prefer the term tradeoffs.

Given my druthers, I think that a good resonant dipole with its center up a least 25 to 30 feet above ground is the best all around HF antenna for portable use. It has high efficiency, is quick to set up and gives reliable, predictable performance. A single band setup is usually either a horizontal or inverted vee dipole. Other variations on this theme to give multiband capability can be fan dipoles with separate elements for each band, trap dipoles or segmented dipoles to change bands with jumpers. Yet another method of multibanding a dipole is to feed it with open wire line and to use a good balanced wire ATU. The downsides of using dipoles are the need for high antenna supports and as much space as 66 feet for a 40 meter antenna. This is often impractical for short term setups in public park areas without special permission and prior approval.

A variation on that theme is the end fed half wave antenna (EFHWA). It too is a half wave wire but it is fed at one end, rather than the center. Since it is also resonant on harmonics of its lowest frequency, it can be used on multiple bands with appropriate matching. In fact a 40 meter half wave also works on 20, 15 and 10 meters and can be segmented to work on 30 meters as well. The EFHWA can be nearly as effective as the CF dipole but still has similar support and space requirements. My home antenna is an inverted-U 40m EFHWA than also acts as a quarter wave antenna on 80 meters.

Vertical antennas can be quite space efficient. The most common one is a quarter wave vertical element, either wire or metal tubing. An old adage says that a vertical is an antenna that radiates equally poor in all directions. This is only the case when an inadequate ground (or none!) is used. Since the vertical's ground system is the other half of the antenna, it is quite important, though not easily achievable. Simply laying out a couple of wires on the ground or relying on the coax cable feedline is a poor way to go. An ideal ground system is one with 100 or more radials each with a length equal to the vertical's height. More practical setups using only four radials result in only 50% or so efficiency and consume lots of space as well as being a tripping hazard. A resonant elevated radial setup is quite good though cumbersome. As with dipoles, verticals can be multibanded. Practically speaking loaded short verticals need to be at least 1/8 wave long for any sort of effectiveness without an extensive ground radial field.

Mobile antennas are generally short verticals and can suffer significant loss. A good ground to the vehicle chassis can be quite effective, though for common 8 foot or less mobiles, efficiencies can be as poor as 10% or so on 40 meters though somewhat better in the higher bands. Top loading schemes like the "bugcatcher" and lengths of 16 feet or more can be good. Many QRO park operators use such "mobile" antennas to good effect, but using 100W or more power makes quite a difference. BTW, magnetic mount antennas for HF are not a good idea unless they have a separate ground lead to the vehicle chassis. Without this, the feedline shield makes a poor ground with inconsistent results.

Many ops also use somewhat random wires running as an inverted L or sloping wire. As with the verticals, size matters as does having a decent ground system. A single radial on the ground does very little and puts significant RF on the feedline shield which, in addition to being inefficient is inconsistent and can cause "hot chassis" problems. The popular EARCHI antenna uses a 30 or so foot radiator wire and relies on having a "25 foot" coax feedline which is a bad idea as described above. It also uses an iron-core "matching transformer." This scheme is highly inefficient since the "transformer" helps get a good match mainly due to its high loss feeding widely varying impedances. Again some QRO ops use them with some success though for QRP they are ineffective and inconsistent.

OK that's enough negativity. Let's look at what has worked for me. I began operating in 2016 in the NPOTA program using "hamstick" type helically loaded mobile whips on my car. In NPOTA one needed only 10 contacts a given location for what was called a valid "activation." Even with this marginal antenna things worked fairly well though 40 meters proved difficult. The whips were mounted on a Diamond K-400 mobile mount on the hatchback of my SUV. Originally I had erratic results, which disappeared once I added a short wire from the mobile mount to the hatchback hinge hardware to effectively use the car body as my ground system. Hamsticks for 30 and 20 meters were switched out to change bands.

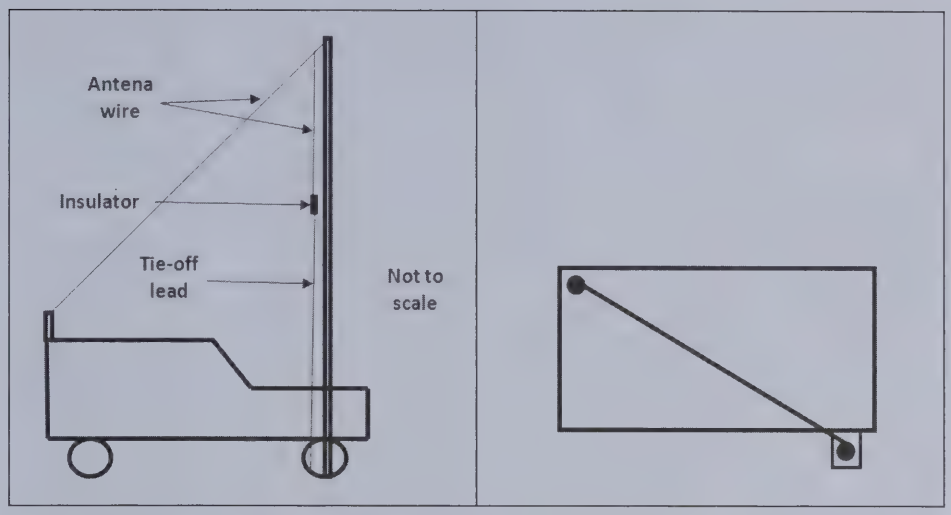


Figure 2—Simple sketch of the 40M sloper: from side and from above.

Figure 3—The sloper deployed at the park.

Wanting better results on 40, I finally decided to go big. I lashed up a drive-on mount for a telescoping 30 foot fiberglass pole. The pole was secured under the passenger side front tire (Fig 1). I ran a 40 meter quarter wave wire from the mobile mount attached to the hatchback at the driver side rear corner. Figure 2 is a sketch of this and Figure 3 is a live setup at a park near Timonium, MD. The scheme worked gangbusters! Using a full length 1/4 wave wire and the car as a ground made for a very effective antenna. And it had the added advantage of being totally connected to the car and flitting in just about a single parking space. In truth the wire is slightly longer than the theoretical 33 foot length since the end runs down the pole, but it is electrically resonant on 40 meters.

I continued using basically the hamstick and sloper setups for several months, going out each weekend to operate at nearby parks racking up loads of contact. However setting up the drive-on mount and sloper, then having to change hamsticks was time-consuming and tiresome. I wanted something quicker and more convenient to set up and take down.

Gradually I decided that I might be able to fabricate a longer, more efficient antenna that would fit right on the mobile mount. I made an adapter from a wooden dowel with a 3/8-16 bolt through it that would screw into the mount and allow a 16-1/2 foot foot Cabellas™ fiberglass pole to be slipped onto it with a short length of PVC pipe for a tight fit. A 16-1/2 foot wire ran up the pole and was connected to the mobile mount. The mount was modified to add a lug on the "hot" side of the feedline and the wire was connected to it with an alligator clip Figs 4 and 5. This setup was resonant on 20 and was extremely effective, allowing 20 meter contacts all across the US and Canada and even into Europe when conditions were good.

The downside was that though I had effective 40 and 20 meter skywires, I still had to use a hamstick for 30. Well about that time I added an self-supporting air-wound inductor at the bottom of the pole to load the wire up on 30 meters. I reasoned that the 20 meter 1/4-wave was only slightly short on 30 so it should be much better than the 7 foot helical whip and I could change bands just by shorting out the coil with a clip lead. Sure enough it worked quite well.

Then it occurred to me that the loading coil might work pretty well on 40 meters

Figure 4(a) and 4(b)—Telescoping pole adapters.

Figure 5—Air-wound loading coil.

and it had enough inductance to resonate the 1/8 wave wire there. Guess what — it did work! Though not as efficient as the full-size sloper, I now had a solution that fit entirely on the mobile mount, and changing bands was quick and easy using an alligator clip. I dubbed it the Plan B antenna, with the sloper being Plan A.

Yet another bright idea was to get rid of the somewhat fragile air-core coil and replace it with some toroidal coils. Though in theory this seemed to be a poor idea since the toroidal loading coils would have Q's of only 200 or so, while the larger coil would be several times that. A prototype was lashed up and comparative impedance measurements were made between the two configurations Surprisingly the calculated efficiency using the toroids was only marginally worse than with the air wound coil.

This convenient loading coil scheme for a simple multiband vertical antenna was noticed by the QRP Guys and incorporated into their TriBand Vertical Antenna with my permission. They put the toroids on a p.c. board shaped to hold the antenna wire and incorporating slide witches for convenient band changing. I was given several of the loading coil boards to evaluate and give my blessing. I now use this much more convenient configuration and call it the Go-To antenna.

Somewhere along the way the way it occurred to me that a loading coil could be added to the sloper to tune it on 80 meters. A length of PVC pipe over the adaptors on the mobile mount was used as the form on which I wound a loading coil using solid insulated hookup wire. Once again it was a success so with a little more. Later on a second loading coil was wound to add 60 meter band capability.

But wait—there's more! So far I've described my antenna choices using the car as an antenna mount, but how about it I want to set up away from the vehicle? If the weather is decent and I'm close to the car, I simply use the car-mounted antenna and run a length of coax to a handy park

Figure 6—Toroid loading coil.

Figure 7—Loading coils on PVC pipe forms.

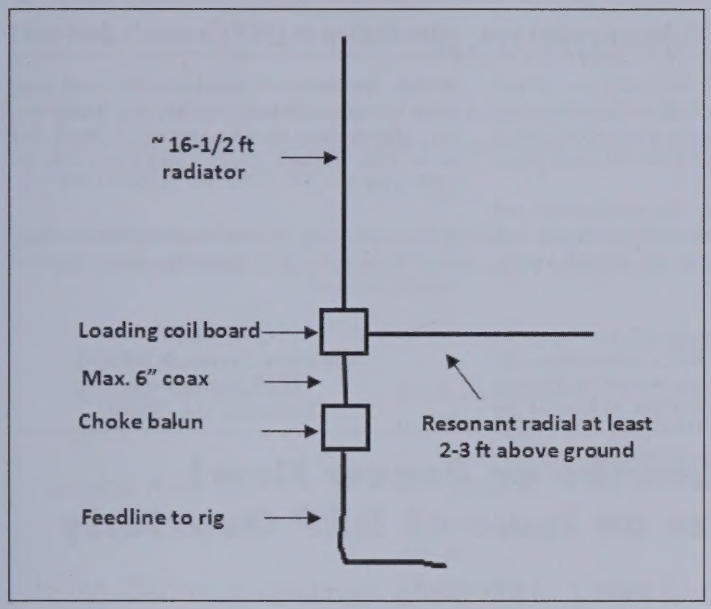


Figure 8—Single-radial vertical.

Figure 9—Clothesline reel holds the radial wire.

bench or picnic table. But when the best location is nowhere near the car, I have yet more solutions.

The first used the Go-To antenna mounted on a 20 foot fiberglass pole. The pole is lashed to a convenient post or tree with the loading coil board 3 or 4 feet above ground. For the required antenna ground I then use a single elevated resonant radial. A simple choke balun is used to isolate the coax feedline from the antenna and the radial is either run along handy wooden fence or strung out on some bushes or between convenient trees. For efficiency it needs to be at least 2-3 feet off the ground and run away from the antenna in a straight line (Fig 8). Since the radial needs to be resonant, I used some hookup wire wound on a clothesline reel (Fig. 9) and knotted at the approximate 1/4 wave lengths for 20, 30 and 40 meters. On setup the exact length can be set by reeling the wire in and out of the reel. The wire remaining on the reel is closely coupled so the length is set by how much is unreeled. Now this setup is admittedly somewhat less efficient than when the antenna uses a car ground and is directional along the radial, but it's repeatable and effective.

I have a final option for times when the single-radial vertical is impractical — a magnetic loop antenna. It is a W4OP Loop sold by LNR Precision. It is four feet in diameter and can be mounted on a sturdy camera tripod or wooden picnic as long as it is at least three feet above ground. Though not nearly as electrically efficient as my other antennas, it is probably the most efficient portable loop antenna sold to radio amateurs. I've found it roughly as effective as the hamstick whips mounted on my car. If you are operating on a motel balcony, the front steps of national historic landmark, a wall by the Statue of Liberty or in the National Mall in DC it can't be beat. Figure 10 shows the loop in operation.

References

1. World Wide Flora and Fauna http://wwff.co/

2. Parks On The Air https://parksontheair.com/

3. The progression of N2CX portable antenna configurations has been documented in a number of Joe's Quickies in WA8MCQ's Idea Exchange column in the *QRP Quarterly*, beginning in July 2016

4. QRP Guys Tri-band Vertical Antenna https://qrpguys.com/qrpguys-tri-band-portable-vertical-antenna

5. W4OP Loop https://www.lnrprecision.com/loop-antennas/

6. W4OP Loop Review, N2CX, *QST*, Mar 2019, Pg. 52

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Figure 10—W4OP Loop set up and ready to operate, as Joe explains.

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